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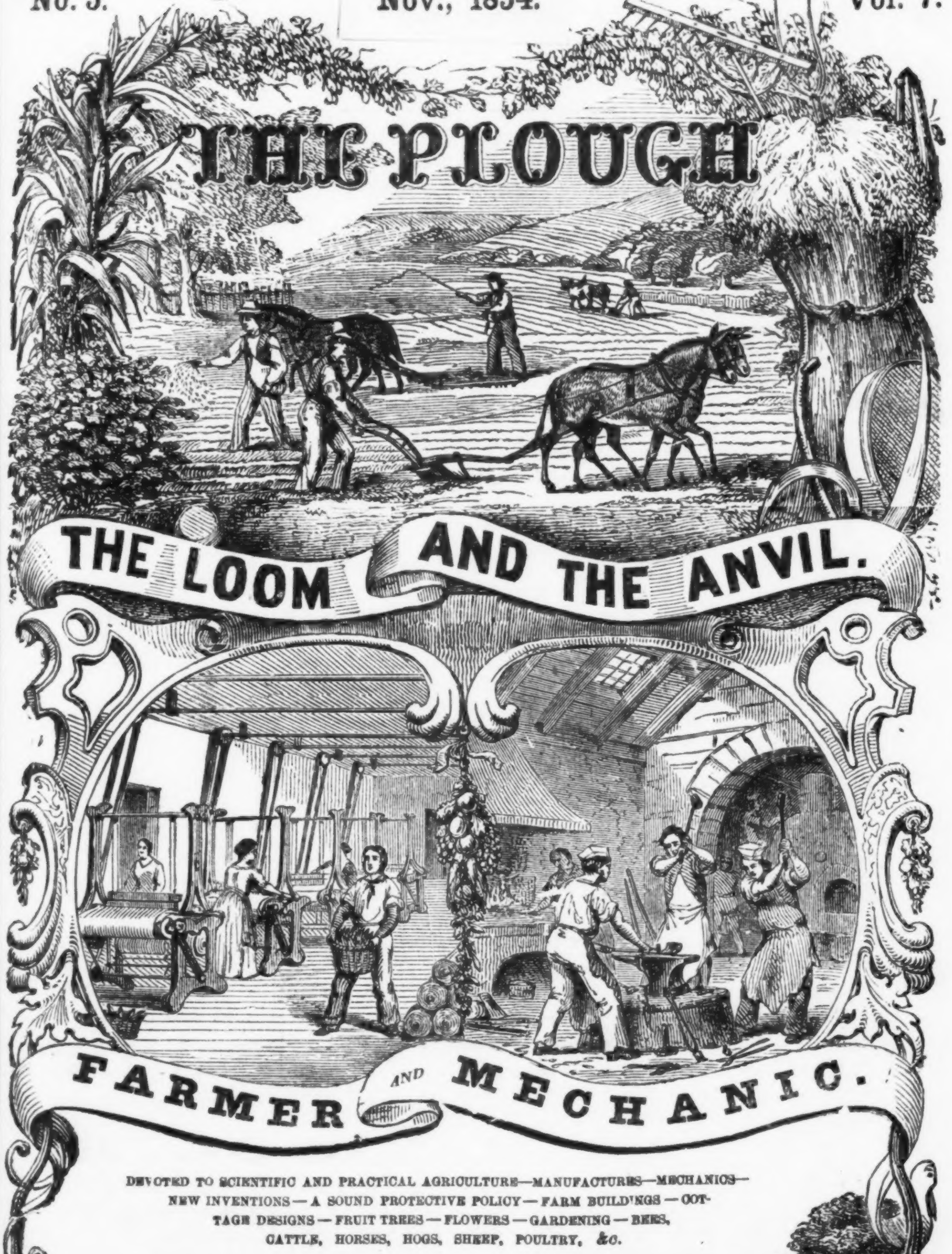

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The Plough, the Loom, and the Anvil.

VOL. VII. NOVEMBER, 1854. No. 5.

VEGETABLE PHYSIOLOGY.

SOURCE OF THE NITROGEN ABSORBED BY PLANTS.

IN our last number we alluded incidentally to the question which has been discussed so earnestly, Whence do plants obtain their nitrogen? Does the atmosphere yield its nitrogen to plants, or do they obtain it by the decomposition of ammonia?

This question has excited much attention in France, and has been the occasion not only of most laborious experiments, but also of very learned discussions. Among those who have especially devoted themselves to the consideration of this subject are Messrs. Boussingault and Ville, who arranged themselves on opposite sides of the question. At a session of the Academy of Arts and Sciences, in March last, M. Boussingault presented a memoir, containing the full details of numerous experiments, very carefully conducted, and which led him to conclude that the atmosphere does not furnish nitrogen to plants. This memoir we should be very glad to present to our readers, but while it occupies 26 pages, of quarto form, in the *Comptes Rendus* of the Society already named, it consists almost exclusively of the practical details of the experiments. But we have translated such portions of the memoir as are necessary for a full understanding of the essay, and the conclusions he reached, omitting only the description of the details of the several experiments. The learned writer begins and proceeds as follows:

"The question whether vegetables fix in their organism the azote which is found in the atmosphere, in a gaseous state, is not only interesting in a physiological view, but its solution would throw light upon the theory of the fertility of soils. In fact, if gaseous azote is not assimilable, if its influence is only to temper, in some sort, the action of oxygen gas with which it is mixed, we discover the value of organic matters in manures, which, by their spontaneous decomposition, furnish to plants the elements of azotised matters which they elaborate. If, on the contrary, azote is fixed during the process of vegetation, if they thus become an integrant part of the vegetable, we are naturally led to this inference, that the greater part of the fertilizing properties of manures resides in their mineral substances, in the phosphates, the carbonate, earthy, and alkaline matters, which they always contain in notable quantities, for the azotic element would be certainly furnished by the atmospheric air.

It is true, that in former times, when reliance was placed upon eudiometric methods, (apparatus for testing the purity of the air,) it was supposed that a manifest absorption of azote could be discovered during the development of a

plant; but more recently, Theodore de Saussure, who employed more exact methods, did not succeed in verifying such absorption; but, on the contrary, the researches of this eminent observer tended to convince him that there was a faint exhalation of this gas, and if there remains any doubt in respect to this phenomenon, it is because the manometric processes (apparatus testing the density, etc., of the air) adopted by Saussure, do not give well-determined results, as a change quite considerable may occur, either in the volume or in the composition of the atmosphere in which the plant has remained. These processes amply establish the fact, for example, of the decomposition of carbonic acid by the green parts of vegetables, because the action of the solar rays is made immediately obvious by the appearance of oxygen gas. The manometric method is very often unsatisfactory when the point is to decide whether some cubic centimetres of gas have been absorbed or exhaled by a plant confined in certain litres of air. But, when after the lapse of several years, after having reëxamined the facts favorable or contrary to the idea that vegetables appropriate azote from the atmosphere, I find that the question may be considered as unsettled, I deem it proper to pursue this inquiry, in the hope of resolving it in a manner entirely different from that in which it has heretofore been treated. I compare the composition of seeds with the composition of crops obtained independently of every thing but the sun and the air. The plant develops itself in a soil thoroughly calcined, to destroy the least trace of organic matter, and watered with distilled water. It then appears that the vegetable has acquired a portion of carbon, of hydrogen, of oxygen, and of azote, during the course of its development. See, under the report of the azote, the results obtained in 1836 and 1837:

Plants cultivated.	*Duration of culture.*	*Weight of the grain.*	*Weight of the crop.*	*Azote in grain.*	*Azote in crop.*	*Gain or loss of azote.*
Clover,	2 months,	1·576 grs.	3·220 grs.	0·110 grs.	0·120 grs.	+0·010
Clover,	3 "	1·632	6·288	0·114	0·156	+0·042
Wheat,	2 "	1·526	2·300	0·044	0·040	—0·003
Wheat,	3 "	2·018	4·260	0·057	0·060	+0·003
Peas,	3 "	1·211	4·990	0·047	0·100	+0·053

This shows, 1st, that in a soil absolutely deprived of manure of organic origin, and under the influence of the sun and water only, the clover and the peas acquired, independently of carbon, of hydrogen, and of oxygen, a quantity of azote appreciable by analysis. 2. That the wheat, cultivated under the same conditions, took from the air and the water carbon, hydrogen, and oxygen, but that the analysis could not discover a gain or loss of azote, without which one might, however, definitively conclude that the wheat has not the power to fix a certain quantity of azote.* As to the origin of azote assimilated under these circumstances, the analysis was powerless to determine, since this element might enter directly into the organism of plants, or else, as Theodore de Saussure thought, it might be derived from the ammoniacal vapors of which the atmosphere is never entirely deprived, although it contains them only in very minute quantities. So, in 1838, the result of the experiments which I made reduced the question to this: Does the azote, assimilated by a plant cultivated in the open air, in a soil deprived of organic matter, come from the nitrogen gas, (of the air,) or from the ammonia? I add, that more recently, the experiments that have been tried have led to contradictory conclusions.

If it is considered how feeble is the proportion of azotised substances elaborated by a plant placed in a sterile soil, although the culture of the vegetable

* *Annales de Chimie et de Physique*, 2d series, tome 77, p. 52.

is protracted through several months, one is little disposed to believe in the intervention of the azote of the air; for if this gas intervenes, we can not see why the assimilation should be so limited, while it predominates in the composition of the atmosphere; on the contrary, the small portion of azote assimilated is readily understood, on the hypothesis of the intervention of ammoniacal vapors only; because since the atmosphere does not contain, so to speak, more than traces of the carbonate of ammonia, it could not furnish more than a very limited quantity of azotised elements to vegetation, carried on only under the influence of the air and of water.

The first idea which presents itself to the mind, in determining the question whether the azote appropriated comes from that which the atmosphere contains in a gaseous state, is to arrange an apparatus in which the plant will grow in air deprived of ammonia, and which is constantly renewed, suitable provision being made for the supply of carbonic acid, as a source of carbon. Still, on reflection, there is danger that such an arrangement does not furnish all desirable guarantees; for if the air passes through the apparatus very rapidly, and it will not fail to be so in case the carbonic-acid gas is not added, there will be no certainty of retaining all the ammoniacal vapor, all the organic corpuscles in the system for purification consisting naturally in a series of tubes of sulphuric powder. Still further: suppose, also, that the purification of the air has been complete, and also that azote has been fixed, during the process of vegetation, all that we are strictly authorized to conclude is, that this azote could not have come from the ammonia; for, to admit that it had made a part of the air in a gaseous state, it would be also necessary to prove that, independently of volatile ammoniacal compounds, and of particles of organic origin, the atmosphere does not contain, in proportion sufficiently feeble to escape the ordinary process of analysis, other elements capable of concurring in the formation of azotised substances in the vegetables. Hence it will be only in the case where the experiment shall determine that there has been no assimilation of it, that this method can be considered satisfactory.

From these considerations, in the researches which I have undertaken, I have preferred to make use, in the cultivation of the plant, of an atmosphere that was not renewed. My experiments commenced in 1851, and were continued to 1853.

It is with an apparatus in circumstances like that which I have described, that the experiments were made in 1851 and 1852. Grains were sown in pumice-stone reduced to the condition of small fragments, which were separated from the too small pieces by the sieve, then washed, calcined, and left to cool, taking all the cautions previously indicated. I have always introduced into the soil dust, after calcination, from ashes obtained from farm-yard manure, by a process of incineration obtained at a comparatively low temperature. The manure was first cut up, well mingled, dried, and then burned. Since it is well established that manure is suited to all kinds of cultivation, its ashes naturally contain all the mineral substances necessary for the plant. The quantity was varied with the amount of the soil, and generally the ash was obtained from grains like those on which the experiment was to be made.

The dust, being well moistened with water free from ammonia, it was allowed to remain twenty-four hours under a bell before the seed was sown. * * *

The fundamental principle of the method consists, as I have said, to determine the quantity of azote contained in a grain; then, afterward, the quantity of azote contained in the plant, the issue from a grain equal to that upon

which the former determination had been made, vegetation being always accomplished in such conditions that all organic azotised matters should be thoroughly dispelled. In fact, it was designed, by means of analyses, to ascertain if there was, in the crop, a quantity of azote equal or superior to that which the seed contained. * * * *

At the time of harvest, azote is found in the plant, in the soil, and even in the crucible, the matter of which, by reason of its porosity, absorbs and retains a portion of water charged with organic substances.

The plant, after drying in a furnace kept at a moderate heat, is cut, by scissors, into very small fragments. When it is thus divided, and all the parts are intimately mixed, a portion is taken to be submitted to analysis, and from this the amount of azote in the whole is computed. This is the ordinary course, and it is thus that I have sometimes proceeded. But now I believe I ought to criticise this practice. The plant, though well divided and mingled, is not so homogeneous that one can be sure, when the question is of very delicate appreciation, that the fraction on which he experiments, perfectly represents the whole. It is preferable, as I have always done in these more recent experiments, to operate with the whole of the crop, employing for its combustion tubes of a large size, and executing all the operations with care. The error of which the result is then affected, is that which is inherent to such processes, and which, whatever may be its importance, is not multiplied by 3, 4, 10, or 100, as a third, fourth, tenth, or hundredth part only of the plant was analyzed. It is especially when the point is to ascertain the quantity of azote in the organic *debris* scattered in the soil where the roots habited, that it is important to operate upon large quantities of matter. I have been able, by means of large tubes of Bohemian glass, to analyze either all the soil, or large portions of it, in such a manner that in the most unfavorable cases the whole error of the product was at most to be tripled. In proceeding otherwise, and not taking, for example, more than one gramme for analysis, and making two or three operations, most erroneous results may be obtained, since the dried soil coming from one experiment sometimes weighs near a kilogramme. The error made, and no analysis is exempt from it, will then, according to its kind, be multiplied by 333 or by 500, and if supposed to be only a demi-millegramme, that which one would commit upon a quantity of azote contained in the soil, might reach to 0·15 grs. or 0·25 grs. It would certainly be better not to take account of the azotised matters retained by the soil or by the crucibles. For in cases where the plant has not wilted, where there has been no fall of leaves, and where the *debris* of the roots has been carefully raised, the organic substance mingled with the soil is of very small moment, and the quantity of azote which enters into its constitution is not of a nature to change the results obtained from a comparative analysis of the seed or of the crop.

The determination of the azote was made by the process of M. Warrentrap, modified by M. Pelijot. The normal acid was prepared with very great care. Nevertheless, as the chief point is to prove differences, I have as much as possible employed the same acid to determine the azote in the seed and in the crop. When one is to operate upon a large quantity of soil, containing only a small proportion of the *debris* of a plant, he should pass 20 or 30 grammes of matter into a large tube, after having well mixed it with a very little lime, and receive, in a single small tube of normal acid, the ammonia resulting from repeated combustions, in order to lessen the error peculiar to the determination of a standard. By leaving the tube of Bohemian glass in which the matter was burned, to cool slowly, the constant breaking of it may be

avoided. I have been able, by means of this precaution, to make the same tube serve eight or ten determinations of earthy matters.

I have paid especial attention to cleansing, (*balayage*,) which is requisite at the end of each analysis, by the decomposition of oxalic acid placed in the bottom of the tube. It is known that the aim of this operation is to draw away in the acid liquor, with the hydrogen, and the aqueous vapor produced under these operations, the last traces of ammonia, formed under the influence of the alkaline hydrate. When this manipulation is not properly executed, it very sensibly affects the result. The loss of azote, occasioned by an insufficient cleansing, is the more important, as the substance examined is the more azotised; or else, for equal quantities of azote, or the substance which contains them, contains less organic matter capable of furnishing hydrogen gas or vapor during combustion. It is thus, for example, that for the same quantity of azote, a very moist substance will give, perhaps, all the ammonia produced before the oxalic acid is decomposed, while, if it had been dried beforehand, all the ammonia would not disappear without the aid of a well-sustained current of gas or of aqueous vapor. The reason is very plain. It is because, in the first case, the ammonia will be carried away by the vapor which will be developed through the whole of the operation. After numerous attempts, I am forced to believe that one gramme of oxalic acid, undergoing decomposition, is not always sufficient completely to expel the ammonia when a substance is analyzed containing three or four per cent of azote. So I have employed at least two grammes of this acid, in the determinations executed during the course of these investigations.

If, in a soil destitute of organic matters, containing the ash of manure, and well moistened with water free from ammonia, some grain of good quality is thickly sown, and if seed is then sown in a confined atmosphere, and provided with a proper proportion of carbonic-acid gas, note what ordinarily takes place. All the seeds germinate. At a certain time, the color of the leaves, the size and the rigidity of the stalks, in one word, the vigor of the vegetation, is similar to that of a culture carried on in a fertile soil. But if, from this prosperous state, and before harvest, one is disposed to conclude that the plants have found in the confined air, and in the water which the soil has imbibed, all the elements which have assisted in their development, he will expose himself to a mistake which analysis will speedily reveal. In fact, if the plants have acquired great vigor, it is because they have not vegetated in a sterile soil. Counting the grains will show that their number is less than the number of grains sown. There was not place for all, and those which did not germinate served to fertilize those which did. In this case, experience, though interesting, becomes complex, as I shall show in this memoir. The soil naturally is charged with a considerable proportion of organic substances; in fine, one is no more competent to judge how a vegetable supports itself, which, except the matter of its own organism, has nothing by which to develop itself but atmospheric air, carbonic-acid gas, water, and mineral substances.

In my researches, I have constantly obtained a number of plants equal to the number, which was very limited, of seeds sown; and thus I have found this advantage, that the earth contained but very little of organic *debris*, because, not producing more than one or two plants, I arrest the vegetation when I see the vigor of the plant begins to diminish before the leaves begin to fall. The crops, dried all at once, have also a weight which permits the whole to be analyzed in one or two operations, a condition which I consider as very favorable to accuracy of result.

[Then follows the account of three courses of experiments, in all their minute details, which occupies too much space for us to transfer to our pages. The learned writer then concludes as follows :]

The result of all these experiments is that the azote of the air is not assimilated during the growth of kidney-beans, oats, cresses, and lupins.

At a meeting early in April (1854) M. Ville renewed the discussion, as follows :

"Last year I had the honor, on two different occasions, to submit to the judgment of the Academy the results of my experiments upon vegetation. These researches have principally for their object to throw light upon the origin of the azote which plants take from the atmosphere, and to determine the form under which this azote is absorbed. An uninterrupted series of experiments, which commenced in 1849 and terminated in 1852, led me to decide that the ammonia of the air does not furnish any of the azote which plants borrow from the atmosphere. If one cultivate a plant in calcined sand, which is inclosed in a bell of which the air is renewed many times a day, although this air is deprived of all floating particles and of all ammonia, it will be found that this plant fixes an important quantity of azote; from which I have drawn the conclusion that the azote of the air could serve for the nutrition of plants.

In the session of 29th March, the Academy received a communication, the conclusions of which are in opposition to mine. This communication emanates from a distinguished man, whose opinion has great authority. On the other hand, I nevertheless maintain all my conclusions. I see nothing in the facts which are cited which can invalidate them. Thus, on the one hand, it is admitted that the azote of the air is absorbed by plants, and, on the other, it is denied that this absorption takes place. The question is then brought into very narrow limits, too narrow not to insure that the truth shall be elicited from the discussion of proofs which each invokes for the support of his opinion. But that this discussion may be profitable in its results, we should be careful to recall the phases which the question has assumed, at different times, since Saussure, and to bring to light the efforts, often dissimilar, but always persevering, which have been made for two years, to place the theory, which asserts that plants derive azote from the ammonia of the air, in harmony with the facts in good husbandry which falsify it.

The first efforts which inculcate the absorption of azote by plants are traceable from Saussure. In the experiments of Saussure, he never had an absorption of azote. But we know, notwithstanding, that the results attained by this learned man show the insufficiency of the method which he pursued. In fact, if clover and peas are cultivated in calcined sand, although they are watered with pure water, and although they are warmed in the interior of a glazed pavilion, to shelter them from the particles what float in the air, it is found that these plants absorb notable quantities of azote. Such experiments have been made through two years in succession, by M. Boussingault, and always with the same result. On the other hand, I have myself verified the reality of this absorption. Thus all agree that plants take part of their azote from the air; but some attribute the origin of this azote from the ammonia of the air, and others from the azote itself. This last opinion is that which I sustain.

The learned men who give preference to the contrary opinion, the learned men who attempt to trace the origin of the azote of vegetables from the ammonia of the air, accord to the rain an important influence in this phenomenon. They admit that the rain condenses, under a feeble volume, the traces

of ammonia which are dispersed in the air, and draws to the plant, in a reduced form, the azote which it requires. Thus the rain is the vehicle of the ammonia. But if this opinion is true, we have a simple way to find it out. In fact, it would be required, of necessity, that the rain-water which falls upon one hectare of ground, in the course of a year, should have sufficient ammonia to account for the azote which certain crops require, beyond the azote of the manure which served to produce it.

Under this aspect, facts are contrary to the theory. In Alsace, the crop which one hectare of land produced, cultivated with artichokes, contained 43 kilogrammes of azote more than the manure which had been applied to the land. On the other hand, the rain which fell upon the surface of one hectare did not contain more than 3·54 kilogrammes of ammonia, or 2·92 kils. of azote. Evidently, the 43 kils. of azote absorbed by the plants could not come from 2·92 kils. brought down by the rain.

To this it is answered that in rain-water there are nitrates, and that nitrates are as useful to vegetation as ammonia. Admit that it is so; admit beside, which is very improbable, that in one cubic metre of rain-water falling upon the field there are 14·98 grs. of anhydrous nitric acid, which is the quantity found by M. Barral in rain-water at Paris; and admitting, finally, that all of the nitric acid and ammonia is appropriated by the plants, it is found that one hectare of land received at Strasbourg, under the form of ammonia and of nitric acid, 29·35 kils. of azote, which is very far from 43 kils. absorbed by the artichokes.

To this it is again replied, rain-water contains much more ammonia at the beginning than at the end of a shower; the water which descends in fogs and dews abounds in ammonia; plants receive ammonia not only from the rain, but also from dew and from fogs. Every reduction of temperature, condensing the water which is in a state of vapor in the air, becomes to the plants a source of ammonia. Finally, beside all these sources, particles which float in the air add to this supply.

To all these reasonings I shall offer but a single objection. I shall demand whence comes the azote which the clover and the peas have absorbed, in the first experiments of M. Boussingault? Vegetation was carried on in the interior of a pavilion. The plants were consequently deprived of rain and deprived of the fogs. They received no nitrates, and by the acknowledgment of M. Boussingault, particles floating in the air had no influence upon the vegetation.

I reserve to another time an inquiry into the question, what the water did or did not contain, and whether it is as rich in nitrates as we have admitted it to be. But it seems to me that if these principles (elements) play so important a part in the production of plants as is claimed, a hectare of land watered by distilled water should produce a smaller crop than the same extent of surface watered by rain-water. But what is true of a hectare should be equally true of a fraction of a hectare. For the purpose of assuring myself, I made the two following experiments: Two boxes, of zinc, and varnished in the interior, were taken, each of which measured one metre on a side, and 30 centimetres in depth. In each box was a layer of pebbles, carefully washed, then a second layer of 100 kilogrammes of earth. The two boxes were buried in the soil, at a depth of 25 centimetres, and surrounded with a pavilion, with glazed windows, which opened on all sides like the doors of an apartment. The top of the pavilion was covered also with a glazed sash, which was an inclined plane, to afford an escape for the rain. A hudometer, having a surface equal to that of one of the boxes, was by the side of the box. After

every rain, the water was collected and poured upon one of the boxes. Upon the other, an equal volume of distilled water was poured. The experiment was commenced on the 15th of March and was terminated on the 15th of July. The result was not favorable to the theory that the azote of plants is derived from the azotised matters of rain-water.

The difference between the two crops consisted in the order (ordre) of development which was observed under the same circumstances. In fact, the surface watered by rain produced 425·22 grs. of crop, in which were 3·9 grs. of azote. The surface watered with distilled water produced 469·4 grs. of crop, in which were 4·1 grs. azote.

To this experiment it may be objected, it is true, that rain furnishes to plants only a part of the azotised matters which they receive from the atmosphere, while the greatest part comes from the fog or the dew, and, above all, from the particles floating in the air. This opinion can not be supported, for the same grain as that cultivated in the boxes, cultivated in the same soil, though inclosed in a bell, the air of which was renewed many times a day, after being deprived of all the particles which it held in suspension, produced as much grain as that cultivated in the open air, and double the amount of straw. Beside, facts of another class seem to me to leave no doubt as to the secondary part which the azotised matters of rain play in the nutrition of plants. We have admitted that a hectare of earth, cultivated with artichokes, takes from the air 43 kils. of azote, because the crop contained 43 kils of azote more than the manure.

In assuming this number of 43 kilogrammes as the expression of the quantity of azote furnished by the atmosphere, we have supposed that the whole of the azote of the manure had been appropriated by the crop. If, contrary to this hypothesis, it can be demonstrated that a part of the azote of the manure is lost during the progress of the growth, that it is dissipated in the air, in the form of ammonia, it results from this, that the surface under culture will in fact have absorbed more azote than has been claimed; and if the ammonia brought by the rain is only a fraction of what the soil has lost, it is evident that, in either case, the azote absorbed by the growth could not come from the ammonia of the rain. But this loss of a part of the azote of the manure is placed beyond doubt by an experiment of M. Boussingault. This learned man has found, in fact, that a bed of snow which had remained during thirty-six hours upon the soil of a garden, contained 0·085 grs. of ammonia per litre of water, more than the water from the same snow, collected immediately after its fall. As to the origin of this excess of ammonia, M. Boussingault adds that, to his mind, there is the highest evidence that it came from vapors emitted from the soil.

But if we admit that the bed of snow had one centimetre of depth, it will follow that each square metre of surface corresponds to 10 litres of water, which shows, consequently, the certain loss of ammonia to be 0·856 grs., on one square metre, in thirty-six hours, and, consequently, the certain loss to be 856 grammes per hectare in the same time. If we admit, finally, that each day of the year the loss has been the same as in that upon which the snow fell, we arrive at this result, that one hectare of garden-soil, upon land on which the snow has remained for thirty-six hours, dissipates, in the course of one year, 208 kilogrammes of ammonia, or 172 kilogrammes of azote. I would not attach to these numbers more importance than belongs to them, but present them only to establish the principle; for it is evident that if the azote which the earth receives from the rain is but a fraction of the azote of the manure lost by the earth, then the excess of azote on the crop can not

come from the ammonia of the rain, from fogs, nor from dews. But this is the only point which I wish to make prominent. Thus, while the most recent analyses apportion to the rain and to the air, more and more minute (faible) quantities of ammonia, on the other side, on the contrary, a more profound study of the production of plants establishes beyond doubt, that the air furnishes to plants much more azote than has been supposed. I have thought that it would not be without profit to bring to the light these two facts, before I occupy myself with the last memoir of M. Boussingault. My answer to this memoir will form the subject of the second part of my communication.

[During the next session the discussion was resumed by Mons. Ville, and the following report is made of his remarks, in the printed journal:]

"I come to the memoir which forms the subject of our disagreement. This memoir comprises three points: 1. A critique of the method I have pursued. 2. An exposition of a different method which the author considers preferable. 3. The general conclusion that the azote of the air is not absorbed by plants. I proceed to treat of each separately.

In his researches, M. Boussingault has never obtained more than a few grammes of growth. The weight of this growth is scarcely three or four times that of the seed. Thus, to cite only two examples: In 1852, a bean, weighing 0·53 grs., after two months' cultivation, produced 0·90 grs. of crop; in 1853, two of the lupin, weighing 0·82 grs., produced 1·72 grs. of crop. All the results were analogous. On the contrary, in my experiments in 1850, 3·4 grs. of seed produced 64·20 grs. of growth, (dried to 120 degrees.) In 1851, 0·35 grs. of seed produced 68·80 grains of growth, (dried as before.) In 1852, 8·00 grs. of seed produced 229·61 of growth, (dried as before.) Thus, in 1851, for example, the weight of the growth is 186 times that of the seed.

In the experiments of M. Boussingault, the quantity of azote lost during this period of culture, varied from 0·019 grs. to 0·124. In my experiments, the only quantities of azote absorbed were:

In 1849, . . .	0·103 grs.	In 1851, . . .	0·481 grs.
In 1850, . . .	1·180 "	In 1852, . . .	1·624 "

So, under the double report of the quantity of growth obtained, and of quantities of azote absorbed, there is a very marked difference between the researches of M. Boussingault and myself.

On the other side, if we inform ourselves of what is passing in natural vegetation, we shall find that plants develop themselves much more than in my experiments. We shall agree that they contain much more azote, and that they reproduce their seed every year. In my experiments, the wheat has produced grains of perfect organism, and the sun has produced rudimentary grains. In the experiments of M. Boussingault, there is never a vestige of fructification. So, in a general manner, I have more nearly imitated the conditions of nature than M. Boussingault. This result is independent of all numeric calculations.

2. In my experiments, the quantity of azote absorbed is considerable. One contends that this azote comes from the azote of the air; another, that its origin is from the ammonia, of which the air contains faint traces. I hasten to examine what this claim has for a foundation. I will limit the discussion to the experiments of 1850.

In 1850, in a bell, into which 65·154 litres of air had been passed, some plants which were sown in calcined sand absorbed 1·180 grs. of azote. To account for this absorption, it would require that the air should contain 17

kilogrammes of ammonia in a million kilogrammes. But we know of a certainty that it contains less than 133 grammes. (Graham.)

It is again objected that the azote absorbed by the plants comes from the particles (poussières) which the air holds in suspension. Admitting that these particles contain 10 per cent of azote, for which this supposition would furnish some foundation, it would require that 11·180 grs. of particles should pass into the bell, that is to say, nearly a million times more than M. Boussingault has ever obtained in a direct examination. (3 milligrammes to 15,000 litres of air.)

In 1851 and 1852, the experiments of 1850 were repeated, but under other conditions. Before entering into the bell, the air passed under coal-dust impregnated with sulphuric acid, and then into a solution of bi-carbonate of soda. Hence, from that instant, the particles of ammonia could not affect the result. But, the plants having absorbed as much azote as in the first case, I draw the general conclusion, that the objections which have been urged against me do not at all weaken my conclusions.

The recent experiments of M. Boussingault have invariably consisted in sowing a few grains in a confined atmosphere, and the experiment has been left to take care of itself. Since 1851, I have been convinced that under these conditions vegetation could not be supported. Indeed, if any one will make two experiments, simultaneously, upon the same plant, upon a cereal, for example, in one of which the air of the bell shall be renewed, and in the other shall not be renewed, in the first the plant will develop a good stalk and produce grain, in the second the same plant will form a very lean stalk and produce no grain. Hence, the renewal of the air is an essential condition to the success of the experiment. But one can not invalidate the results of experiments conducted with a renewal of air, by other experiments conducted in confined air. It may be said, it is true, that I attribute too much effect to a change of air—that plants prosper equally well in the two cases. In order to meet this objection, I have thought it proper to report the following experiment, which was repeated from that of 1837, and for which science is indebted to M. Boussingault:

"The 1st of September, 1837, some clover was sown in a porcelain pot, filled with calcined sand after the pot was inclosed in a bell. Each day 500 or 600 litres of air were passed into the bell; and to intercept particles, it was washed in a tube and bowl of Liebig's, half full of water. But in these new conditions, the clover absorbed 0·008 grs. of azote in a month, and still no account was taken of the azotised matters with which the sand of the pot remained impregnated. Thus, although the recent experiments of M. Boussingault charge a loss of azote, the only one which he had made in which he placed himself at all in the conditions in which I have since experimented, he finds a gain. It is true, that one may still demand why, under these conditions, M. Boussingault obtained so feeble an absorption of azote, and why I succeeded in obtaining one so large. The difference results in a great measure from the nature of the pots used by M. Boussingault. In fact, this learned man has always used pots of porcelain. But in these pots vegetation never flourishes. The sand consolidates itself at the bottom of the pots, the roots penetrate it with difficulty, the gases which surround these do not renew them, vegetation suffers; and the best proof one can have of this is, that M. Boussingault has never obtained a growth more than three or four times the weight of the seed.

When one experiments upon living plants, the first condition is, that they should always be able to fulfill their functions. If a plant is confined, so

that the roots can not extend themselves, if their spongioles can not find a supply of gases and the oxygen which is necessary for them; in fine, if the evaporation of the water which flows into the leaves be obstructed, that plant finds itself in an abnormal condition, and will not succeed. But now, because vegetation is languishing, and plants do not develop themselves, is one authorized to conclude that plants do not find in the air all the materials which their nourishment requires? and, because the surrounding azote is not absorbed, that it is not absorbable in its natural condition? So far from this, in reality, it shows that this result is but the effect of a defective experiment. And, in fact, if we inquire why a plant which is confined in a sphere does not prosper, although it is furnished with more oxygen and carbon and azote than it could absorb under circumstances in which it might prosper, it is because in these special conditions the plants could not relieve themselves of the excess of water which the use of sap caused to flow into their leaves, and the evaporation of which is an essential condition by means of which the circulation of this fluid is secured. And how, in fact, could any evaporation take place? The plant is confined in an atmosphere which is saturated with moisture. Evaporation is not possible until the temperature of the interior air assumes an ascending motion, and during this the elastic force of the vapor of the water augments at the same time with the power of saturation of the air as to moisture. And again, as to this particular case, the plant loses a part of the benefit which this elevation of temperature creates for it, since the water which collects upon the interior walls of the sphere contributes more than the evaporation of the sand to saturate the air with moisture.

On the contrary, in a bell in which the air is renewed, the air which enters is of a temperature inferior to that of the bell. In proportion as the temperature is elevated, it is charged with a new quantity of vapor. Each litre of air which arrives may be considered as a void space which the evaporation of the sand should contribute to fill, especially if one is careful, by an arrangement which I always adopt, to make the air descend from the top of the bell, and to come in contact with the plant before leaving it.

If we strip the discussion of this incidental question, the disagreement is confined to very narrow limits. On one side, it is said that the azote of the atmosphere does not promote the nutrition of plants; and on the other, on the contrary, that it is absorbed by them. To justify the former opinion, one cites experiments carried on in a confined atmosphere; to demonstrate the second, that which ascribes a positive and direct agency to the azote of the air, in the phenomena of vegetation, reliance is had upon experiments made in a renewed atmosphere. The whole question is then reduced to this—to discover whether plants act in the same manner in the two cases. But since, in operating incidentally, in a renewed atmosphere, M. Boussingault has discovered a feeble absorption of azote, the disagreement becomes still more limited, and is finally reduced to the ascertaining whether it is in the nature of the phenomena that it remains feeble, or if, in adopting the conditions which I secured, it can be made stronger. This question can not be solved without a new experiment, under the control of the commission. For myself, I desire to facilitate the execution of this experimentation, and I have constructed two sets of apparatus, which I place at the disposition of the commission," etc.

NOTE.—A millegramme is ·0154 grains; a centigramme, ·1543 grains; a decegramme, 1·5434 grains; a gramme, 15·4340 grains; a decagramme, 154·3402 grains or 5·64 drachms averdupois. 10 decagrammes = a hectogramme; 10 hectogrammes = a kilogramme.

FOR THE PLOUGH, THE LOOM, AND THE ANVIL.

MR. BOYDEN'S PLACE, TOPSFIELD, MASS.

USE OF HAZEL-RODS BY MR. WILLARD.

Messrs. Editors: Having just returned from a visit to my friend, Fred'k Boyden, of Topsfield, you will please accept some crayon-sketches of his freehold, and some of his animals. It is the old Crowninshield Farm and mansion, including some two hundred acres, capable of yielding as many tons of English hay, beside all that is needed for pasture, tillage, and a spacious garden, with a great and choice variety of fruit-trees, shrubbery, and vines accessible by walks which have been sown with salt, so that not a weed or spire of grass impedes the pleasant rambles. It is one large swell of land. The buildings are on the eastern slope, near the greatest elevation, surrounded by many kinds of ornamental trees, among which the fir and maple are conspicuous on the avenues; apple-trees by the walls inclosing and dividing this extensive and princely domain, which were built at an expense of some thousands. The land is generally rich and productive, having suffered little from the drought, so extensively and long prevalent.

It was to designate a spot where to dig for a spring of living water, that I was requested to visit his premises, that might, if possible, be brought to his barns in pipes, where his large stock is now supplied by a chain-pump from a well 40 feet deep, requiring the labor of one man a great part of his time. In this I succeeded by the use of mineral-rods: finding a vein of water 25 feet deep, running toward the barn, from the height of land, till within 12 feet of the surface. From this point it may be conveyed, with a strong pressure, to his stables, and after accommodating his large herd of swine in the barn-cellar under them, waste into a reservoir. I might add, several gentlemen were present during the examination, from different towns, who witnessed the operation of the rods, and the highly satisfactory results. After which, I examined the grounds of another gentleman, who had thought he would spare no expense for an aqueduct, if he could bring water into his chambers. After long and carefully traversing his premises, we succeeded in finding a spring sufficiently elevated for his purpose. This took most of the day, and demonstrated to the most skeptical the merits of this immense labor-saving operation, as a reliable way of ascertaining these subterranean channels, or springs of living water. In some cases, we could trace a vein by the perpendicular attraction of the rods, occasionally setting stakes, and ascertain its depth by stations on each side, where the attraction would be horizontally according to the distance from the stakes over the vein. In one case we found the attraction toward a single point, from any station within fifty feet; hence we concluded there was a boiling spring.

I was highly gratified by inspecting some fifty of Mr. Boyden's pigs, and by learning their pedigree to be unquestionable. They are pure Suffolk, from the Stickney importation. The best plates I have ever seen are a fair daguerreotype of some of his boars. He has one, three years old, as nearly perfect as could be desired. Most of his pigs are from this beautiful sire. I could not leave till I had selected a pair from a favorite sow, which I expect soon to receive by the cars, and feed with pleasure. He has sold some to go to Iowa! We must esteem him a "benefactor," who furnishes the sire and

dam of a breed gaining two pounds of fat per day, with the same feed that would, in any other breed, gain but one, no less than he who does the same in grass.

When we had taken tea, I feared we should miss the cars, as the railroad station of Beaver-Brook was three miles distant. He said, "No"—harnessed his stallion, 19 years old—looking at his watch, said, "Time enough." True; we were there in twelve minutes, under a check rein. He showed me his young stud, "Tri-color." The next day was Cattle-Show at Lawrence, and I notice since, in the *Massachusetts Ploughman*, "The first premium of $20, for best stallion, 'Tri-color,' was awarded to Frederick Boyden, of Topsfield." I saw some of the stock of both his old and young horse, two-year old colts, that he said could not be bought for $200 each! His swine were exhibited last year, and are known and appreciated. I doubt not the publisher, the writer, and the subject of this article, would participate in the pleasure of aiding in the wider circulation of this choice breed of swine, if twenty farmers, in as many counties this side of Iowa, should each send for a pair, or a boar only, to cross with the best sows of other breeds; thus giving them service in supplanting some of the wretched animals I will not describe.

Yours, truly, BENJAMIN WILLARD.

Lancaster, Mass., Oct. 4, 1854.

BUILDING MATERIALS.

GRANITE AND SYENITE.—Granite occurs very extensively through this country, but it generally occupies a small extent of surface. It is protruded in the form of veins and irregular beds. What is denominated granite is not always properly so called. The true granite often passes into syenite. The difference is this: Granite is composed of quartz, feldspar, and mica. Syenite, of quartz, feldspar, and hornblende, with very little mica, or none at all. The far-famed "Quincy Granite" is a true syenite.

These rocks occur extensively in Canada, and on through New-England, being separated from those of Canada only by a narrow strip of more recent rocks in the valley of the St. Lawrence. From New-England they extend south-westerly, parallel to the coast, in a belt, somewhat limited in width, nearly to the Mississippi. On the west side of the continent, granite and its associates constitute the base of the Rocky Mountains.

The prevailing rocks in the mountainous region of Essex county, N. Y., are hypersthene, which is a variety of syenite. Granite and syenite form the most durable building material, and can be wrought into very handsome forms. We have seen wreaths, oak-leaves, and other fanciful patterns, cut in very bold style from this rock, on the caps of pillars, pilasters, etc., with very good effect. Still, in beauty it must yield to marble, which has beauty in itself as well as in the designs sculptured out of it.

When very large buildings are to be erected, admitting architectural designs suggestive of grandeur rather than lightness and grace, the granite is a very suitable material. We know of but one objection to it, and that is its inability to bear the *experience* of a fire. It endures heat without injury, and in this may be and probably is superior to marble, or the brown sandstone, (which we are yet to describe;) but if water is thrown upon it when

thoroughly heated, chips fly from it in great quantities, and the finish of the surface is utterly ruined. It may be even that the whole block, thus exposed to sudden change of temperature, will split in pieces. We have seen window-caps, and other small blocks, thus broken in more than one instance. But those who have seen the Tremont House, in Boston, or some of the large warehouses on the *wharves* and water streets of that city, or have noticed Trinity Church, in Summer street, and the two beautiful blocks of stores by the side of and opposite to that church, to say nothing of some others in Milk and Pearl streets, in that "Granite City," will no doubt agree with us, that it is a very admirable material for such uses as we have described.

The most widely-known quarries of "granite" in this section of country, (Eastern Massachusetts,) occur at Cape Ann, Quincy, and near Chelmsford, all in Massachusetts. A ledge of this rock extends from Cohasset to Quincy, and another from Cape Ann to Salem. Valuable localities are also found in Danvers and Lynnfield. On Cape Ann, at Squam, blocks have been cut out 60 feet length, and at Pidgeon's Cove, 100 feet long and 4 feet thick. Most of the granite of Eastern Massachusetts is good as a building stone, while nearly all in the western counties is coarse and quite unsuited to such uses.

The famous Chelmsford granite is quarried, not in Chelmsford, but in the adjoining towns of Westford and Tyngsboro'. At Pelham, N. H., 4 miles from Lowell, and at Fitchburg, granite of similar character is found. The latter constitutes the mass of a hill 300 feet high. At these localities it has been quarried to some extent. Granite suitable for building is also found in Western Massachusetts, in Northampton, Whately, and Williamsburg, and a good syenite in Belchertown. The westerly part of Worcester county, Hampshire, Hampden, and Franklin counties, also produce a gneiss which forms a good building stone.

In Rhode-Island, gneiss is the predominant rock, through the southern and western parts of the State, and some valuable quarries are wrought.

The cost of these blocks is small compared with almost any other kind of rock suited for such uses. Those of the Bunker-Hill Monument, in a rough state, delivered at Charlestown, was 13 cents and 3 mills a foot. The cost of hammering and fine dressing granite, in Boston, on the style of the Tremont House, is 30 cents a square foot. The columns of the Hospital cost one dollar a foot.

As already suggested, granite extends over nearly the whole length of the States. But the number of quarries, at least those known beyond their own neighborhood, is comparatively limited. The survey of South-Carolina has made known to the public several very fine quarries within that State. In Lexington and Newberry districts fine granite for building purposes is abundant. It extends for many miles, and being near the banks of a navigable river, is of convenient access. It is described as resembling a coarse gray marble. The granite of Kershaw is remarkable for its crystalline structure. There is also a porphyritic granite near Camden, which is said to be very handsome. Syenite occurs in Abbeville, Fairfield, and Lexington districts, which is described as resembling the "Quincy Granite." Gneiss also occurs in the same State, some of the varieties of which are equally substantial and desirable as syenite, although the proportions of the minerals of which gneiss is composed differ very much in different localities. Gneiss underlies most of the marbles of South-Carolina, and when these are opened other treasures, equally valuable, may thus be made productive.

We regret our inability to point out many more of these sources of wealth, existing almost without limit in numerous sections of our country. If our

readers will give us information on this subject, each in his own locality, and through as much wider extent as his information will permit, we shall cheerfully give room for it in these pages. Our object is to draw out these hidden treasures from the comparative ignorance which prevails everywhere, almost, out of New-England, in reference to them, and by making them known, open new sources of wealth and of beauty and of convenience. They are far more valuable to a community than those of silver and gold, and each section of country, as far as possible, should rely on their own resources for these very important productions.

The sand-stones, etc., will occupy our attention in our next issue.

RAISING FOREST-TREES.

Why will our land-owners fail to do "themselves and the state" good service, in giving their practical attention to this sort of culture? No crop is surer nor so sure, and many crops that cost much labor will not pay half as well. Wood must be in great demand in this country for all kinds of use. As fuel, it can not be entirely dispensed with. For a building material, for many sorts of structures, there can be no substitute, and for a thousand miscellaneous purposes it is indispensable. We can do as well without grass as without the product of the forest.

We have recently described the proper culture of the locust, a tree of preeminent value. Other trees are as essential in their way. And some will pay a compound interest. For example: a sugar-maple grows and flourishes with a vigor scarcely diminished, though forced to yield to the sugar-maker many gallons of sap every spring. Probably a little more careful cultivation would restore all the loss it might otherwise sustain. Hence it furnishes a very profitable crop, always commanding cash in the market, while it also produces as pleasant a fuel as can be found. We know of nothing, unless it be hickory, which is more desirable for such use. For charcoal it is one of the best of trees—while its timber is useful for many purposes. Beside all this, it possesses uncommon attractions as a shade-tree.

Birch-trees can be sown or transplanted with very little cost or trouble. The chestnut is also a desirable tree. It flourishes where many crops would starve. A dry sandy loam, enriched only by its own product, is its natural soil. Hence it would prove successful on land where little else would grow, and where nothing else would render a very liberal return. The most important elements required by deciduous trees are alkaline. Nearly one tenth part of the ash of such, and even of most trees, is of this character. Hence, when pines and other evergreens have been cut off, and the land has been burned, we find a second growth of deciduous trees. The land is changed in its character, so that what had before but a scanty supply of these elements, is now better furnished with them, and under these improved circumstances the seeds of the deciduous trees, dispersed everywhere, by winds, snows, water-streams, birds, animals, etc., germinate and grow, to the exclusion of those for which the soil and other conditions are not now so well adapted. Trees of the fir tribe, we are told by Liebig, grow upon the sand-stone and lime-stone of the Carpathian Mountains, and the Jura. The finest forests of deciduous trees

cover the soils "of gneiss, mica, slate, and granite, in Bavaria; of clinkstone on the Rhone, of basalt in Vogelsburge, and of clay-slate on the Rhine and Eifel, while they can not be produced on the sandy or calcareous soils on which pines thrive."

The black-walnut and the butternut (quite worthy of culture for its capital nuts) need a deep gravelly loam, or a rich clay. A calcareous soil is best adapted to these. The hickory, oak, beech-tree, etc., will not succeed so well in sand, but either of these trees will grow in any good primitive soil. Oak grows well on any variety of good soil, if it be not too wet.

The various nut-trees should be sown before the nut is thoroughly dried. Follow nature. Those with a hard shell require the action of the frost, and should not be buried too deep. If not quite fresh when planted, all seeds should be soaked in water before they are sown, and with many, if gypsum or other fertilizer is partially dissolved in the water, and suffered to adhere to the seed, so much the better. Seeds, properly matured, are nature's only reliance, and hence, if we are wise in copying her ways, we can not fail to obtain the reward of our labor. The cedar grows in any soil, from dry sand and gravel to rich loam.

But something more than this general information is desirable; for in fact this is no more than any observing man would be likely to discover for himself, and therefore we present, in a concise manner, the principles adopted in countries where such culture is systematically entered upon. In some parts of Europe, the growth of forests is as scientifically conducted as crops of wheat. The following method, which combines the culture of trees and of ordinary crops, is perhaps as judicious and as practicable, in this country, as any other plan, though by no means the only one by which a growth of trees may secure substantial benefit both to the land and to its owner.

For new countries, where the original forest is still in existence, the first suggestion may be important, but it would not of course be applicable to the older sections of our country; such farmers are interested only in the subsequent suggestions, but all these are worthy of note everywhere. We proceed to set forth our method:

1. Choose a forest the circumstances of which are appropriate to such a treatment, and divide it into a certain number of sections or *cuttings*, having regard to the condition and qualities of the soil, climate, and the kind of tree desired.

2. Each year one of these sections is cut down and cleared, and the soil is devoted to cereals, as an ordinary field.

3. A kind of tree adapted to the wants of the place is selected, and these are planted in rows, at a distance of 50 feet or upward, as one has a desire to increase the growth of wood, or of grass, or of grain. The stems of the trees forming these rows should be from 2½ to 4 feet distant.

4. Between the rows of trees grain or some other crop may be cultivated, so long as the trees will not injure them.

5. When the trees grow to such a size as to injure each other, part of them should be cut down.

6. The land should not be cultivated when the trees shall produce a shade injurious to the crop. Other trees should be cut from time to time, until a suitable number is left, regard being had to the use to which the trees are to be applied, whether for fuel, timber of large or small size, etc.

7. When the trees have reached a suitable age they should be cut down, the stumps removed, and other trees planted. But the trees should now be

planted where the crops were cultivated before, and the crops sown where the former row of trees was grown.

8. The rows of trees should range north and south.

Fruit-trees or forest-trees might be treated by this method with great benefit.

On the selection of the place, regard should be had to the exposure, and position, as well as to the soil.

Grounds that are to be treated in this manner should be well prepared and cultivated. To plant trees when the soil is not in a suitable condition, would be a waste of labor.

Numerous comparisons have shown that a growth of sixty years, thus conducted, tully equals that of one hundred and twenty years in the native forest. More abundant crops are obtained by the alternate culture of different kinds of plants. If a soil, exhausted by successive crops, is planted with trees, and it remains forty years in this state, cereals will afterward grow upon it with much more vigor than before, and even for some years, without manure. But fruit-trees and vines can not succeed each other on the same ground with advantage.

In India, when the soil is exhausted by crops of indigo, trees are planted for the purpose of restoring its fruitfulness. In default of trees, the ground is covered with branches, or brushwood, which are useful in restoring freshness and vigor to the soil. Every thing which covers the ground promotes its fertility. A heap of stones at the foot of a tree promotes its growth.

Among the advantages of this system, one important consideration is that by it no ground is wasted. The space required by the trees, in different stages of their growth, is furnished, while the cultivation of other crops is not interfered with by the growth of the trees. When cereals can not be profitably raised, crops of grass may be obtained until the growth of the trees is such as to interfere with any other crop. When the trees have reached a certain growth, they will not be liable to injury if cattle are turned in to feed upon the grass, while trees that are planted in pasture-lands are often destroyed.

ON PRUNING TREES AT THE TIME OF TRANSPLANTING.

How should trees be pruned at the time of transplanting? or should they be pruned at all? are yet open questions among planters. As the subject will at this season of the year be one of the most general interest, we propose to offer a few remarks on it.

The objects in view in pruning a tree at the time of transplanting are threefold. First, *the removal of all bruised and broken roots and branches.* The necessity of this is obvious and indisputable: bruised and broken roots when planted without being dressed, must decay and interpose very serious obstacles to the formation of new roots; they should therefore always be pruned off closely to the sound wood, and with a sharp knife that will make a smooth, clean cut, the sloping surface of which should invariably be on the under and not on the upper sides of the roots. In making the cut, the knife should be laid to the under side of the root, and drawn upward. The young roots which subsequently spring from the cut end of the root, as from the end of a cutting, strike downward at once, as is natural. The reasons for pruning off broken or bruised branches are equally obvious. A broken branch left

on a tree will produce an unsightly and in some cases a dangerous scar; but if it be pruned off close to the body of the tree, or to a sound bud, the wound will soon heal over or a new shoot will be produced. It is very common, in pruning hastily, to leave small portions of branches without eyes. These, instead of producing new shoots, die off, and the new wood growing in around them produces unsoundness that in many cases brings the tree to an untimely end.

The second object in pruning is, *to mould the tree to the desired form.* Trees coming from the nurseries are seldom in the exact shape that the planter wishes. They have too many side branches, their heads are too low or too high, or they have some other defect which the knife must remedy. Now the question comes up, How far is it judicious to attempt the formation of the tree at the moment of transplanting? Several points must be considered. If the trees are standards for the orchard, and they happen to be somewhat slender in proportion to their height, it would be unwise to prune off *closely* any side-branches they might have, because this would direct the future growth to the top, and urge the tree still further out of balance and proportion. In such cases, the aim should be to increase the growth of the *stem;* and this can only be done by retaining two or three good eyes or buds of every side-shoot, or of a sufficient number of the strongest and best, and by reducing the attracting power of the branches at the top. The influence of this is seen in the case of forest-trees planted in the street, where the entire head is sawed off at planting, and nothing but a bare pole or pollard left; the growth is thrown into the trunk, which soon becomes covered with new shoots, and increases its diameter rapidly. If the tree has been pruned up too high in the nursery, making the head higher than desired, a new head must be formed lower down by cutting back the tree; but whether it is better to attempt this at the moment of transplanting, or wait until the tree has taken root, and is capable of making a vigorous growth, is a question. This is a point of some importance. We know that newly-planted trees push but feebly at best, in comparison with those well rooted, and that the shoots produced the first season make a very indifferent frame-work for the tree. We have considerable experience on this very point, and we have come to the conclusion that it is much better to defer the pruning which is to produce the final and permanent form of the tree, until the second year, or until the tree shows unmistakable signs of being well rooted, and in a condition to make vigorous growth. But care must be taken to preserve and encourage, as far as possible, young shoots with active buds on the parts where we intend to produce the new head; because *old* wood, in which the buds have become in a measure dormant, does not throw out branches with desirable rapidity and vigor.

If, on the other hand, the head be too *low*, the first impulse would naturally be to prune it up. But this demands some caution. Where branches of considerable size are pruned off, when the tree is transplanted, and consequently unfit to make much growth, the fresh surface of the wounds dry up, and do not heal over quickly, as when the tree is in an active and vigorous condition. Beside, buds are essential to growth; and if too great a proportion of them be removed at once, the power of the cells or sap-vessels is impaired, and they can not transmit the nutritive fluids from the roots upward. The roots, too, lose their activity, and general stagnation and debility follow. The better way is to reduce the head by thinning out some branches and shortening others, especially the lower ones; and in the season following, or when the tree has fairly recovered from removal, the large branches may be

removed and the stem formed higher up; the upper shoots allowed to remain having sufficient power to maintain the functions of the different parts of the tree in full force and vigor.

The third object in pruning at the time of transplanting is, *to restore the balance or proportion between the roots and branches, which has been disturbed in the process of removal.* A transplanted tree, no matter how carefully or skillfully it may have been operated upon, has its system materially deranged. The roots may neither be bruised or broken, nor the fibres dried or injured by exposure; and yet the ordinary functions of the various parts, and their reciprocal action and influence upon each other, can not but be in a measure arrested for a time. The roots can not abstract nutriment from the soil, and convey it through the trunk and branches, to supply the demand of the leaves, until they have taken to their new position and emitted new rootlets or feeders. Until this takes place, the demand of the leaves must be supplied from the stock of nutriment previously laid up in the cells, just as we see young shoots subsisting for a time on trees that have been cut down or torn up by the roots. As long as any sap remains in the cells, and can find a passage to the leaves, the latter continue green and healthy; but as soon as the sap is expended, and the cells dried up, the leaves wither, and vitality terminates. Transplanted trees are, until re-rooted, in the same situation, nearly, as trees cut down or rooted up and left on the surface of the ground—that is, they must rely mainly on the sap existing in the cells before removal. Now it is plain that the more of buds and leaves there are on a tree, the greater will be the demand upon its stock of sap or nutrition, and *vice versa.* Hence the reason for recommending to reduce the tops of trees at the time of transplanting. For this reason we can not transplant deciduous trees safely while in full foliage. Even strawberry plants root better by having a portion of their leaves removed; and hence the use of bell-glasses and other contrivances to prevent evaporation from the leaves of newly-inserted cuttings. A tree transplanted with a small number of roots, or damaged roots, and a branchy top, will suffer from the evaporation of the leaves, just as a cutting of leaves would if it were freely exposed to the air, though perhaps not to the same extent. Some trees will bear planting with smaller roots and larger tops than others—such, for instance, as the poplar and willow, and all those that root easily and rapidly, and have large sap-vessels through which nutriment absorbed by the roots can pass quickly to the leaves.

But we must remember, too, that leaves are necessary to the growth of roots. It is true that new roots are formed in the absence of leaves. We can see this illustrated in the case of early autumn-planted trees or cuttings: yet these roots would not attain any considerable development, nor survive long without the action of the leaves; for these may be likened to the animal stomach, in which the indispensable process of digestion takes place. No matter how abundant or healthy may be the roots, or how liberal the supplies of nutriment presented to them, if the leaves be not present to draw it upward and assimilate or *digest* it, growth can not continue—the roots will cease to lengthen, and ultimately perish. This is forcibly demonstrated in the case of trees that have been stripped of their foliage by insects, or some accident; the roots cease to grow; but as soon as new leaves begin to appear, new roots are formed simultaneously: and if one side of a tree be stripped of its foliage, the roots more directly in connection with that side will cease to grow until new leaves appear. In propagating plants from cuttings, it is necessary, in many cases, and indeed in almost all cases where young wood

is used, to leave a certain number of leaves. Cuttings that root without leaves are those of a soft nature, having large cells or sap-vessels full of organized matter or tissue capable of developing roots and sustaining them until the leaf-action commences.

From all this we see how important are the leaves, and how easy it would be by excessive pruning to hinder rather than promote the formation of roots. There is a medium which should be aimed at in pruning, to induce growth after removal. If the roots are much injured, or naturally meagre or defective, a very small number of active buds should be retained, just sufficient to stimulate and sustain circulation of the fluids. In such cases it may be necessary to cut back every young shoot to one or two eyes. Where the roots are abundant and sound, it will suffice to cut out the weak inside-shoots, and shorten the stronger ones about one half. In doing this, a large number of buds are removed, and whatever force there is in the tree is thrown into the remaining shoots, and young wood will be formed where we should have had nothing but leaves if the tree had not been pruned. The growth of young wood always favors the formation of roots. If we examine trees now that were transplanted last spring, we shall find that the roots are in proportion to the number and strength of the young shoots.

The great object in pruning to promote growth is *to direct the sap into a smaller number of channels, and thus increase its force.* If a tree, for example, has 500 leaf-buds to draw upon its sap, and we cut away 400 of them, the remaining 100 will of course receive a far greater proportion than they would have done, and will consequently be enabled to make new wood; and experience teaches us that young shoots with their large cells, luxuriant leaves, and great vital activity, act far more powerfully on the roots than the small, lean foliage of trees merely living but not growing. We know how cutting back acts upon stunted trees. A three or four years old apple or pear-tree, for example, if cut down nearly to the ground, will, in one season, make a growth equal to that of two or three seasons under ordinary circumstances; and this is simply because its whole vital force is concentrated in one point. The sap rushes there, and large cells are formed immediately, in which a rapid and powerful circulation takes place.

All operations upon trees should be performed cautiously, because whatever produces a sudden or violent change in their condition, can not fail to be attended with a derangement of their wisely and beautifully-adjusted organization, and this derangement must be more or less injurious to their healthy existence. Every man who takes his knife in hand to mutilate a tree, should bear this in mind, and weigh carefully the consequences of every cut. We intended to have referred to the opinions of experienced and skillful arboriculturists on this subject, but we can not at present devote more space to it. What we have said will, we trust, induce reflection and observation on the part of some who have heretofore been too indifferent.

STOPPING A RUNAWAY HORSE.—Around the horse's neck, near the neck-strap, is placed a running knot. To this slip-noose is attached a pair of reins—on gentlemen's horses it may be a silk cord, about the size of a pipe-stem—which may always lie thrown over the dash-board, ready to be seized at once. When a horse starts and becomes unruly, the gentleman takes up this cord and tightens the horse's throat so that he can not breathe. The most furious horse stops almost instantly, but he will not fall or kick.

TRANSPLANTING TREES IN THE AUTUMN.

"Do you approve of fall-planting?" is a question asked us every day. Our answer is, *Yes*, under these circumstances:

1st. When the ground is of such nature and in such condition that water will not lodge around the roots of trees during winter. To plant trees in holes sunk in stiff, tenacious soils, is a certain method of killing them.

2d. The trees should be *perfectly hardy*. All delicate or half-hardy trees should invariably be planted in the spring. If it be necessary to take them up in the fall, they had better be laid in by the roots in a *dry soil*, sheltered from the cold, cutting winds, and, if necessary, protected with boughs of evergreen, or something of that nature.

3d. We do not approve of planting evergreen trees in the fall, unless the very hardiest sorts, and that quite early, say in September or first of October, in time for the trees to re-root, partially, before hard frosts; and they should be sheltered from the sun and wind by a thick screen of evergreen-boughs, well secured around them.

4th. Plant trees *early*—as soon as circumstances will permit after the wood is ripe. Don't wait till the leaves fall, but cut them off, being careful not to injure the buds. Late planting, however, if well done, may be equally successful. We transplant any time most convenient, between the first of October and first of May. Last winter, in December, we planted several hundred of specimen trees, from one to six years old, and lost not over two or three in the whole. Many of the bearing trees, notwithstanding the drought, have borne and ripened fine specimens of fruit.

5th. Secure all trees from being blown about by the winds, and mulch with half-rotten manure or leaves three or four inches deep.

Asparagus, rhubarb, gooseberries, and currants should all be planted in the fall, and as early as possible. Also, hardy bulbs, such as hyacinths, tulips, narcissus, crocus, crown-imperials, and lilies. It is also the best season to top-dress and renovate neglected trees of all sorts, to make new walks and repair old ones, to lay down turf, and perform such operations as grading, draining, trenching, etc., incident to the formation of new gardens, lawns, etc. Our springs are short, and hot summer weather very often comes too soon. It is therefore well to make a good use of every hour between this time and the freezing of the ground.—*Horticulturist.*

EXPERIMENTS IN FATTENING CATTLE.

We would be cautious in saying or doing any thing to diminish the number of well-contrived experiments in any of the numerous departments of agricultural economy. But we would do all we can to secure the essential characteristics of carefulness and precision in the management of the experiment, and in the statements of facts, and carefully estimate the practical value of the inferences that may be drawn from those facts. It has become, it would seem, a current usage, of late, to adopt certain modes of conducting experiments against which we feel bound to enter our protest, and to invite all who would fairly investigate the questions at issue to think well before they attempt tofound any theory upon results thus attained.

In the feeding of cattle there are such things as *laws of life*—certain principles of physiology, which are and ever must be in constant action, the overlooking of which must lead to conclusions utterly deceptive. Brute animals are subject to these laws as much as our own species. A few illustrations, from what a large proportion of our readers have experienced in themselves, or observed in others, will fully explain our meaning.

Who has not seen peculiar effects follow from an *occasional* indulgence in the use of coffee or strong tea? Yet, when habituated to them, by daily use, no such effects are apparent. Or, feed freely a child, accustomed only to milk, with roast-beef, and who does not know that the services of the family physician will very soon be put in requisition? And still again, who has not seen even alarming symptoms produced by the use of warm cakes, just from the oven, when eaten by those unused to such food? And yet most people eat either and all these things with apparent impunity. And why this difference? Why does our right-hand neighbor at the table indulge very freely in fat meats, without evil consequences, while we, should we indulge in them to one tenth the extent he does, should be helpless in our bed within twenty-four hours? Yet such is not a supposition merely, but a matter of fact. The answer is obvious. One has become accustomed to these articles of diet, and the other has not. The system of the one is not in the same condition as that of the other. The digestive organs of one have learned to manage this or that kind of food, while to those of another they are not familiar, but are nauseating or otherwise positively offensive.

Or, recur to the very animals for whose benefit we write. Who has not learned that when a friend from the country visits you, whose horse has been fed only on hay, or with the addition of potatoes and the like, it is unsafe to give that horse a full allowance of well-dried corn? And yet it is not true that horses can not safely feed on corn. It does follow, however, that many kinds of food are not so beneficial to animals not accustomed to them, as to those which are.

But again, feed a cow entirely on hay, and she will grow fat upon it. But accustom this same cow to one of the richer kinds of feed, till she has acquired the habit of expecting it, and the system is used to it, and then deprive her of it, but still give a liberal allowance of hay, as before, and for a time she will not take kindly this change of diet. For the benefit of those who are uninformed upon this subject, we add, that these are all matters of our own experience or our personal observation.

And what is the lesson they teach? Obviously it is this, that when frequent changes are made in the daily feed of animals, we have not a fair test of what is the legitimate effect of the constant use of those kinds of feed. We do not think a month is long enough to furnish conclusive evidence as to the effect of many kinds of feed now recommended for common use. Such experiments as those which we criticise, are not useless; but they do not show, or rather we do not know that they show, what would be the precise effect of the constant use of such feed, and are therefore unable to say whether this or some other is the more desirable. In a former volume, we published the experiments of a gentleman of Worcester, Mass., whom we personally know to be abundantly qualified to judge of any given facts; but he fed his cows only for one week upon the different kinds of feed, the value of which he wished to test. And what was the result? One cow actually lost flesh upon the same feed on which another by her side grew fat rapidly. And this is just what we should anticipate, provided the animals were previously unaccustomed to eating the feed which was made the subject of the experiment.

Had that feed been continued for three months, the result might have been alike favorable with all the animals, or perhaps appearances would have furnished less satisfactory evidence of the value of the article fed to them, than their effect for a short time on some of the animals would lead us to anticipate.

We are well aware of the difficulties arising from a change in this respect. It would involve the necessity of forming a judgment as to the comparative value of two or more kinds of feed, by the effects produced by them on different animals. But we see not how this is to be avoided, nor scarcely do we desire to avoid it. It would only involve the necessity of trying the experiment on a much greater number of animals. And this is just what ought to be done. The great difficulty in almost all such questions is, that we draw a general conclusion from a very limited number of facts—like foreign tourists who attribute to the citizens of a state or nation the peculiarities which they see in a few with whom they come in contact. We know of a score of foolish persons who believe Friday to be an unlucky day, because they actually know of a dozen mishaps that have occurred on that day. They are not mistaken in their facts, but in their conclusions. So, too, that long list of believers in Mesmerism, Spiritualism, *et id omne genus*, they are not mistaken in what they have seen or heard, but in the theory which they build upon them.

Who has not known, in his own experience, that the temporary use of certain articles of diet are efficient, chiefly in preparing the system to make the most of what is afterward taken as food? Some kinds of food are "loosening;" others tend to costiveness. Some are anti-febrile, others are stimulating; and that diet which corrects any of these abnormal conditions, just prepares the way for a peculiarly favorable action for other forms of food. The system is thus qualified to make the most of them.

So, too, it may be important to note the season of the year when certain practices are adopted. The feed of an animal is necessary, not only to produce muscle and vital fluids, but also to excite animal heat, and that which is best in a cold atmosphere may not be equally favorable in the heat of summer. We imagine that even green grass, if it were used in the depth of winter, would not prove to be exactly the same thing, in its effects, that it appears to be in the heat of summer. And surely a more carbonaceous food is desirable at one season than at another.

Now suppose "four cows," fed upon ruta-bagas, or turnips, or oil-cakes, or any thing else, did accumulate more fat, or give more milk, while eating them for the space of one week—what then?

1. These cows might have been in a condition to be peculiarly affected by the given kind of feed before beginning this experiment; or, 2d, they might be more easily acted upon, favorably or unfavorably, by their feed, than other animals, just as a spoonful of castor-oil will have four times the effect on some persons that it has on others; or 3d, the organs of some of them might be in such a state, or so to speak, the animal might be of that temperament, that the benefit of a given course of treatment might not be fully developed within the few days in which that treatment was pursued; or 4th, the allowance made for a given animal might be too little or too much, and thus the effect of a suitable quantity be still undiscovered. Would the effect of a quart, of a peck, and of two bushels of apples, at one feeding, be the same even in kind? Or 5th, these animals might have a peculiar fondness or dislike for a certain kind of feed, growing out of some past habit or incident—

just as certain accidents have produced a permanent disgust in some persons for a particular dish.

We may be thought to be making prominent some very trivial matters, but wisdom discovered long ago that little matters are the very things that demand attention. It is the "little foxes that spoil the vines," and very often little things only determine the preference to be given to one of two or more good things.

But all these are not little matters. If there is demonstration or any thing like it in these short experiments and isolated cases, then we can prove that fats are a very wholesome diet, that coffee and tea produce hysterics, and that a quart of new rum can be drunk at once with impunity. We can point to the persons whose experience, in one or more instances, bears us out in each one of these statements.

And what then? Why, just this. If you would test the value of any production as feed for cattle, you must give that production,

1. A trial for such a length of time as fully to test the effects of an habitual use.

2. You must wisely plan your experiment, properly proportioning the dry and the wet, the solid and the liquid, the concentrated and the diffused. It does not follow that oil-cake is not *the very best* thing that an animal can eat, because it can not live on that alone. Nor that it is the best, because it can live and thrive a week without any thing else. With proper feed in connection with it, it may be the most efficient of any one thing, though the animal would die even if fed on it exclusively. And its effects for a few days may prove to be as favorable as a gill of spirits to persons in a condition that requires such medicine.

3. You must test these effects by feeding a large number of animals.

4. You must have regard to the point to be reached. This may be either the production of muscle, of fat, of milk, of activity, spirit, etc., etc.

FLAX CULTURE AT THE WEST.

One of the most important and modern establishments for the interest of the Western farmer is that of the "Dayton Flax Company," the object of which is to dress flax upon an extensive scale by the *Buchanan process.* The works are situated about one mile east of the centre of the city, and are now rapidly approaching completion. Messrs. Thos. Kimber, Jr., and Chas. Hartshorne, of Philadelphia, are the managers or proprietors of the patent for the United States. J. A. Grosvenor, Esq., is a proprietor and the manager of the Dayton establishment. Mr. G. is a very intelligent, thorough-going, practical gentleman, who has had much experience in the growing of flax and manufacture of oil. In securing his services I think the company were extremely fortunate. I was not a little surprised at seeing the accumulation of such mountains of flax-straw. The yards and buildings now contain upward of 2000 tons, and yet this is hardly half of what is to come in the present season. The straw is neatly put up in stacks or ricks. *Four* of these ricks are now completed, each of which is 200 feet long, 40 feet high, and 30 feet wide at the bottom. This flax is mostly the produce of

three of the adjoining counties. The company pay $10 per ton for all the flax-straw that comes to them straight and bound, and $5 per ton for the broken.

Mr. Grosvenor informed me that he would probably raise steam and commence operations in the course of the next month, when he has promised me he will send you some account of his success.

There is now cultivated and grown in Kentucky, Indiana, Illinois, and other Western States, *tens of thousands of tons* of flax, for the seed alone, while the fibre is now suffered to go to waste, which, if dressed, would find a ready market at remunerating prices in our own country, and England would gladly buy from us as much more.

I hope the success of this enterprise may encourage the capitalists of Kentucky and Indiana to erect similar establishments in their respective States.

POT-CULTURE OF THE VERBENA.

As the verbena merits a place, and most justly, among popular florists' flowers, perhaps a few hints on its cultivation in pots may be acceptable to those who have not hitherto adopted that mode of culture. I know of no plant more useful or ornamental, as a pot-plant, for decorating the greenhouse during the summer season, when the proper inmates of that structure are enjoying the open air. I do not know if my system of propagating this favorite be new; but as it is simple, certain, and expeditious, it may be as well to state how I proceed from the commencement. I fill shallow pans (such as are used for placing under flower-pots) to within a quarter of an inch of the top with silver-sand, and pour in water sufficient just to cover the sand. I then make the cuttings in the usual way, and push them into the wet sand; put the labels to them, and place them in a hot-bed frame where the heat ranges from 65° to 70°, always keeping the sand wet. The advantages to be realized by propagating the verbena in this way are, that the cuttings never require to be shaded in the brightest sunshine, consequently the young plants are not drawn up long and lanky; the cuttings never stop growing from the time they are put in until they are ready to pot-off, which is in about six or seven days, when they may be drawn out of the wet sand, with a bunch of roots, without injuring a single fibre. The best time to commence operations for growing specimen verbenas in pots is February, or as soon as vegetation commences for the season. It is desirable to pot a few of the best autumn-struck plants for the sake of early bloom; but they never make such handsome specimens, nor continue so long in good health, as plants raised from cuttings in spring. As soon as the cuttings are well rooted, they should be potted into three-inch pots, and placed in a gentle heat for a few days, until they are established in the pots; then top them, and harden them by degrees; never allow them to remain long in heat after they begin to grow, or they will form long naked stems. As soon as the pots are filled with roots, shift into six-inch ones, and from these into eleven-inch pots. During the growth of the plant, all shoots must be stopped, in order to cause the plants to grow bushy; and never allow them to flower until the plant is properly formed, and has as many leading shoots as are wanted. The compost in which I grow the verbena is, equal parts of turfy loam, leaf-mould, and peat, with a little silver-sand added, to keep the soil open. I water twice

a week with liquid manure, and occasionally syringe over head with clean water to cleanse the foliage. If the saving of the seed is no object, all flowers ought to be cut off as soon as they begin to decay. I need scarcely add, that the grand secret in the successful culture of this, as well as of all plants, is efficient drainage; without this, no plant will continue long in good health. If green-fly should attack your plants, fumigate with tobacco; for if the fly once gets ahead, the plants will never recover sufficiently to give satisfaction. Mildew is another enemy which must be looked after. As soon as it is perceived, dust the plants with a little sulphur, which will stop it from doing much mischief.—*Gardeners' Chronicle.*

ANOTHER SPECIMEN OF FARMING.

A WRITER in the *New-England Farmer* says: "I bought my farm of 100 acres in Sterling, Mass., about ten years ago, for a little more than $2000; it is now worth $2500. The stock and tools may be worth $500, making the present investment about $3000. I keep one man in the summer, and a little boy in haying. I can do but little work on the farm myself, say thirty or forty half-days in a summer. I pay in wages, exclusive of board, about $150 a season. I generally keep seven or eight cows, mostly pretty good, but one or two heifers are farrow, so that the lot is no more than an average one. One yoke of oxen and a cheap horse serve for a team. I cut about 16 tons of hay (or 29 in a good season) from 25 acres of mowing, and this, with my corn-stover, straw, etc., keeps my stock.

From the above description, you can conceive that my profits can not be immense; yet, on summing them up, I see no reason to complain: and my inference is that farming must be a good business when well conducted, since I am able to live by it with rather poor management. Recollect, the investment is about $3000, the interest of which is $180.

From my 7 cows I sell 700 lbs., at 23 cts., (in firkins,)	$161
I can raise 200 bushels of corn, and from that, and the dairy, etc., can sell pigs and pork,	150
I sell about $40 worth of apples,	40
Potatoes,	50
Beef,	30
Poultry and eggs,	75
Total,	$505
Wages, taxes, and insurance,	170
Profit,	$336

Beside this, should be reckoned the support of my family from the farm, for we buy little except clothing and groceries, and we live more comfortably than we could in a village for $500, or in a city for $1000. I put the wear of tools and buildings, and my own labor, against the improvement of the farm, by trees and otherwise, which is not less than $50 annually. So that I can not make the profit of the farm (all expenses paid) less than $336 annually, beside our living, which is doing pretty well for $3000 investment, and poorly managed at that.

I have no doubt that a skillful man, with a little extra capital, might make

the farm pay at least double the above profit; but it will help a man to judge of what a good farmer can do, to know what is done by a poor or middling one.

We contrive to raise a couple of heifer-calves a year on skim-milk, and though hay here is worth $16 a ton, I find it is the cheapest way of keeping up my stock of cows. Also, notwithstanding the present high prices, I can not afford to 'sell off most of my hay and stock,' for my butter, at present prices, makes it profitable to keep them. My farm is more than fifty miles from Boston by the railroad, and yet is near enough."

FOR THE PLOUGH, THE LOOM, AND THE ANVIL.

DRYING FRUIT, AND DRY-HOUSES.

Messrs. Editors: My attention has recently been called to an article in your Magazine, copied from the *Country Gentleman*, with reference to drying fruit by a new machine. As is intimated in that article, fruit-drying is becoming a very important branch of domestic economy. The ordinary process of drying apples and peaches is not very profitable; neither is the fruit very good after it is dried; for when dried on scaffolds, etc., it is subject to the visitations of flies and other things, and is also exposed to the weather and rain. For the want of proper dry-houses, many thousands of bushels of apples are lost annually. They, and peaches also, rot upon the ground and on the trees. Now, if we can get up a dry-house which will dry apples and peaches thoroughly and quickly, it is just the thing we want. Can we do it? Yes. And how? First, build a cheap and durable building, and inside of that building place a brick arch, or foundation; upon which place a stove, and around the stove build a large square box, which should run up to the chamber-floor of your building. This box, which surrounds the stove, is the channel through which the heat passes up into the chamber, where is situated another much larger box, (say twelve feet square and nine feet high,) which is the drying-box. In and around this large box are placed the drawers, with twine-sieves for their bottoms, and the meshes of the sieves as large as they can be made without the prepared apples falling through them. These drawers are taken out and put in from the outside of the large box, of course. Draw them out, fill them with your prepared apples, shove them in again, and your drying process goes on nicely, and without your being apprehensive of your apples getting wet with rain, or getting besmeared with flies, etc. The apples dried in this cheap and simple apparatus are clean and white, and will keep a great while, while they will command a great price in the market. They are also high-flavored, and free from defects. In the top of the drying-box should be placed ventilators, through which the surplus heat will escape. To regulate the heat in the box, you only have to close or open the ventilators, and your work is done.

You can build this kind of a dry-house in almost any old building with a chamber to it, so that you can go up stairs to pull out the drawers, etc. With the improved paring-machines and coring apparatuses, which are becoming quite common in the country, persons having many apples to work up can get along rapidly with the business, and have a profitable kind of work for rainy days, beside. Three bushels of good apples will make one bushel of dried fruit, which generally commands in New-York city, if a

good article, not far from $2 per bushel, in the winter season. And as to dried peaches, they always will command a high price in almost any market. They usually sell at from twelve to eighteen cents per pound, which is a very fair price for them, since, in fact, they can be raised and dried much cheaper than raisins and other fruit of a like nature. In this vicinity, (Central New-York,) we can raise peaches with comparatively little trouble; and why would it not be a good business, Messrs. Editors, to dry them and send them to your mammoth market?

I know of a gentleman who is now engaged in drying apples for your market with the kind of drying-house which I have described. His apples are nice, and he says he finds no difficulty in disposing of them at living rates at any time.

I neglected to mention that the drawers should be about twenty inches wide and three feet long, or longer if thought to be necessary.

Now, Messrs. Editors, I hope that some of your numerous readers will try this dry-house this winter, for there is much fruit in the country in the winter season which might be profitably treated in this manner.

This season, I have sold a great many peaches at four shillings per bushel, while many have rotted. Now, if these peaches could have been dried, they would have undoubtedly paid for the labor. So we may say of apples, and other fruit.

The fruit-raising business is becoming more and more common every year, and it is to be hoped that people will pay a respectful amount of attention to it, as vegetable matter is more wholesome than animal flesh. There are numerous avenues in almost all parts of the Union for the sale of fruit, whether green or dried, though the latter is the safest to deal in. Then let people dry more fruit than they have been in the habit of doing, and thus supply a want which has beeen growing for a long time.

Very respectfully, W. TAPPAN.

Baldwinsville, N. Y., Oct. 20, 1854.

WILL RUTA-BAGA PAY TO FEED?—Having occasion a few days since, to feed a pair of large oxen, and having a lot of ruta-bagas on hand, I tried the following experiment. I commenced in December, when the oxen weighed 3800 lbs. I fed them one week with hay and three bushels corn-meal at 75 cents, $2.25; increase, 25 lbs. The second week, I fed them one and a half bushels meal and nine bushels ruta-bagas; with this they ate very little hay; increase, 50 lbs. The third week, fed the same as the first; increase the same, 25 lbs. The results stand thus:

1.	3 bu. meal, $2.25—gain 25 lbs., at 6 cts.,		$1 50
2.	1½ do. do. $1.12 9 do. ruta-baga, at 21 cts.	gain 50 lbs. at 6 cts.,	3 00
3.	The same result as the first.		

I continued to feed according to second experiment, and never saw oxen take on flesh faster, and become sooner fit for the butcher. Be careful always to feed clear meal two or three weeks before slaughter, as otherwise the beef may have the flavor of the bagas. My 'bagas cost me to raise about six cents a bushel. Cattle never cloy on bagas, and I conceive them to be the only root that will pay for raising to feed. All stock like them; I think them worth more than potatoes by the bushel, as they never scour as potatoes do, while four bushels of bagas are as easily raised as one of potatoes.—*Country Gentleman.* G. W. P.

SOLIDIFIED MILK.

We find in the *Medical Monthly* for October, a description of the process for producing this substance:

"To 112 lbs. of milk, 28 lbs. of Stuart's white sugar were added, and a trivial portion of bi-carbonate of soda, a teaspoonful, merely enough to insure the neutralizing of any acidity, which in the summer season is exhibited even a few minutes after milking, although inappreciable to the organs of taste. The sweet milk was poured into evaporating pans of enameled iron, imbedded in warm water heated by steam. A thermometer was immersed in each of these water-baths; that, by frequent inspection, the temperature might not rise above the point which years of experience have shown advisable. To facilitate the evaporation, by means of blowers and other ingenious apparatus, a current of air is established between the covers of the pans and the solidifying milk. Connected with the steam-engine is an arrangement of stirrers, for agitating the milk slightly while evaporating, and so gently as not to *churn* it. In about three hours, the milk and sugar assumed a pasty consistency, and delighted the palates of all present. By constant manipulation and warming, it was reduced to a rich, creamy-looking powder, then exposed to the air to cool, weighed into parcels of a pound each, and by a press, with the force of a ton or two, made to assume the compact form of a tablet, (the size of a small brick,) in which shape, covered with tin foil, it is presented to the public.

Some of the solidified milk which had been grated and dissolved in water the previous evening, was found covered with a rich cream; this, skimmed off, was soon converted into excellent butter. Another solution was speedily converted into wine-whey, by a treatment precisely similar to that employed in using ordinary milk. It fully equalled the expectations of all; so that solidified milk will hereafter rank among the necessary appendages of the sick-room. In fine, this article makes paps, custards, puddings, and cakes, equal to the best milk; and one may be sure it is an unadulterated article, obtained from well-pastured cattle, and not the produce of distillery slops; neither can it be *watered.* For our steamships, our packets, for those travelling by land or by sea, for hotel purposes or use in private families, for young or old, we recommend it cordially as a substitute for fresh milk."

The committee of the Academy is to make its report at an early meeting. The milk, being prepared with sugar, is a little too sweet for those who prefer to take no sugar in their table drinks.

Cranberries on High Land.—Mr. Elias Needham, of West-Danvers, has shown us some cranberries grown on high land, which are of good size, and which, he says, he produces with good success, having raised some one or two hundred bushels a year, and selling them for $3 and $4 a bushel. We have heard his experiments favorably spoken of by his neighbors, and can have no doubt that he finds an ample reward in the crops for all cost and labor. Here, then, is the example; why can not others copy it, and produce this wholesome and palatable food, so that it shall become common on every table?—*N. E. Farmer.*

ANNUAL AGRICULTURAL FAIRS.

Many of these very useful appointments have already taken place, and the results are before us. A few yet remain in the future. We have been accustomed to give a detailed account of some of these heretofore, though of late we have omitted to do so. We have our reasons. So far as the mere recital of the premium-list is concerned, or the publication of meritorious articles exhibited, the labor is almost useless. It gratifies some friends, and others who are interested in these proceedings. And so far as it is an advertisement of a good article, good may result. And though every man should be willing to pay for advertisements, whatever their form may be, we are willing to do *the public* such service, and even the parties in interest, if it does not cost us too much. But were the reports of our committees *what they ought to be*, we should have abundant material for all our periodicals, without recurrence to useless catalogues, or mere lists of premiums. Most of the New-England Societies require statements of the processes employed by the competitors for premiums; and when these are properly condensed, and the merits of each are discussed as they should be, then it would be proper that every journal in the land, even the political and religious, should aid in promoting their general circulation. But, unfortunately, in many cases these reports are confined to the fact that A's butter is better than B's, and C's cows better than D's. And what do the public care for all this, except so far as, in some cases, they thereby are informed where good stock or good machines, etc., may be bought. So far, a general publication is expedient.

We have prepared a short abstract of what we deem most interesting to the public in general, from the reports of various Fairs, or from our own observation. So far as the latter means of information are concerned, we can speak only of three State Fairs—those of New-York, Pennsylvania, and Maryland. But we shall not make these more prominent on that account, but shall govern ourselves by the policy just indicated.

As a general remark, we should doubt whether these exhibitions have quite reached the average standard of merit, or of general interest. This fact is no doubt attributable, in some degree, to the effect of drought during the summer, and still more to unfavorable weather at the opening of the show.

The New-York State Fair was not remarkable for any thing except for Bulls. The show of these was very fine. Horses were very numerous, and a few of them were noble animals. Blood stallions, mares, and foals were exhibited. Among these were Mr. Morris's imported English stallion, Monarch, now aged twenty years; Mr. De Mott's Trustee, chestnut, also imported from England, and now aged twenty-five; and Mr. Burnham's chestnut mare, Molly Stark, with some of her numerous progeny, consisting of a chestnut colt, aged 4 years, by Tornado—a beautiful animal; a two-year old, and a yearling foal.

Of the younger stallions, from other States, and Canada, was Young Liverpool, a beautiful four-year old bay, bred by Truman Derrick, of Canada. This appeared to be "a worthy scion of a noble stock," the sire being Leopard, got by Liverpool out of Sneaker by Camel, (the sire of Touchstone in 1834, and Launcelot in 1840, both winners of the great St. Leger stakes at Doncaster, England.) Queen, the dam of Young Liverpool, was also thoroughbred, being sired by Monmouth Eclipse out of dam by Durock. Mr. Derrick had also two first-rate trotting stallions on exhibition—Young Norman, four

years old, and Young Bashaw, three years old, each combining the points requisite for speed, strength, and endurance.

A fine gray stallion was exhibited by Mr. Harrington, of Bennington, Vt., which was sired by Hamiltonian, a celebrated Vermont horse, dam sired by Comet, Comet by Bishop Hamiltonian, Bishop Hamiltonian by imported Messenger—making Mr. Harrington's horse two crosses from Hamiltonian and only three from Messenger, and half-brother to Hero, Mountain Maid, and other Eastern-bred trotters of celebrity.

A team of three splendid dray-horses, of dark-bay color, and of enormous size, belonging to Adams & Co.'s Express, and brought here from Boston, were much noticed for their gigantic and symmetrical proportions, as well as for their extreme docility, obeying the directions of the driver without any control by whip or rein. Our opinion is, and we feel quite competent to have an opinion on this subject, that the dray-horses of Boston alone would make a greater show than New-York State has yet seen at any one exhibition.

There was quite an extensive show of mules, some of which must have exceeded fifteen hands in height, and were strong, powerful animals, driven in teams of eight, six, and four. Swine, too, were good. Sheep, ditto, etc. But in milch-cows, and in oxen, many a New-England county show we have seen would excel this. So, too, in fruits and flowers. The most respectable show of fruits was from Hovey & Co., of Massachusetts, who made a very good exhibition of pears. The dairy was not well represented: nor the vegetable garden. Agricultural implements were there in great numbers, but few of them were new.

The following is a novel exercise on such occasions. It *may* be useful, though we do not see how:

Spading-Match.—A spading-match came off at the same time with the ploughing-match. It excited no little interest and merriment. The following persons entered:

Daniel Norton, Morrisania, Irish, aged 21 years.
Michael Skivington, Morrisania, Irish, aged 22 years.
John Base, Morrisania, German, aged 20 years.
John White, Morrisania, English, aged 28 years.
Wm. McCoy, West-Farms, Irish, aged 35 years.
Joseph Fitzgerald, Morrisania, German, aged 27 years.

The space to be spaded was 20 feet by 10 feet wide, and to be spaded 10 inches deep, the work to be accomplished in an hour, and like spring-work. There were three premiums to be given—a silver cup, $10; ditto, $8; medal, $4. The competitors worked like good fellows, and amid repeated plaudits. The time varied from 42 to 51 minutes. The first prize was awarded to John Base.

The South-Western Agricultural and Mechanical Association.—The first day of the Fair was called the ladies' day. It was devoted chiefly to the exhibition of manufactures of woollen, cotton, and silks, in which the genius, the handicraft, and the patient perseverance of woman so wonderfully excel. The number of entries in this department was perhaps not quite so great as last year, but the display was full as beautiful.

The second day was taken up in the exhibition of fruits, flowers, vegetables, farm productions and farming implements, carriages, castings, and manufactured wares.

The agricultural implements were the greatest wonder if not the greatest

attraction of the Exhibition on the third day. While surveying the numerous labor-saving machines, says the *Louisville Journal*, which Yankee ingenuity has devised for agricultural purposes, we were led to institute a curious comparison between the farm utensils of this country and this age and the rude and simple tools which were used by the tillers of the soil in the earlier times of civilization and at the dawn of husbandry in Western Europe. Many of such rudely-fashioned implements are still in use in some countries, both of the old and new world, and invariably wherever we find them, we find ignorance and political darkness, a clinging to old remnants of despotic or feudal power, a degraded people, and a corrupt and tyrannous government. In no one feature is the progressive genius of the people of the United States so significantly manifested as in inventions for the benefit of the masses. In the contemplation of such inventions as were presented at the Exhibition yesterday, we saw unmistakable evidences of a free people, of light and knowledge, of an independent and ambitious spirit, of energy, and strength, and genius among the masses, which can only exist where all men are politically equal, and each is in himself a part of the great popular sovereignty. So long as our country is governed only by the principles upon which our State and federal constitutions have been based—so long as we, the people, hold in our own hands the reins of government, this inventive genius will continue to excel, and American inventions will ever deserve the premiums and defy competition in any World's Fair.

Among the cattle exhibited were some of the finest we ever saw. The bulls "Lord John" and "Grand Master," and the cow "Forget-me-not," exhibited by Mr. R. A. Alexander, of Woodford county, were in every respect prize animals. The cattle sired by "Perfection" were decidedly excellent. For fine cattle, Woodford carried off the palm, and Bourbon, Henry, and Shelby contended admirably for the majority of the prizes. Jessamine and Fayette seemed preëminent for fat cattle. Bourbon proved herself as remarkable for prize-hogs as she has long been noted for the best whiskey—and Indiana excelled in fine-wooled sheep. There were several noble-looking draught-horses exhibited, and Jefferson and Louisville obtained a good share of the premiums in that line.

Notwithstanding the lowering aspect of the sky and occasional showers, the day passed off delightfully. Many thanks are due to the indefatigable officers of the Association, for their complete and systematic arrangements, enforcing strict and excellent order, but not less for their cordial hospitality, urbanity, and unremitted attentions to their guests.

CONNECTICUT STATE FAIR.

THIS Show proved to be very successful. The show of imported stock is pronounced to be excellent; that of working oxen is said to have equalled any in the country. There was a fine display of matched pairs of horses, in a great variety of vehicles. Conspicuous among the double teams was one of five pairs of stout workers from the quarries of Portland—a good match for the ox-team from the same place. There is a splendid team of four black horses, heavy workers, from Waterbury. There is a larger and better show of pairs than at New-York, though none equal to the best.

After the double teams, came a fine trial of speed between the fast trotters,

about forty in number. After the general trot, seven of the best were called out, and timed, and trotted a mile in $2.55\frac{1}{2}$, 2.59, 2.59, 3.20, 2.57, and two broke. Several other trials of speed took place, very much to the gratification of the crowd, not only within the inclosure, but upon every house-top and tree commanding a view of the course.

The show of horses was greater than at New-York, and, in respect to those of all work, superior. In high-blooded stock, not equal.

The show of Devons, by Mr. Hurlburt, of Winchester, Litchfield county, would be hard to beat.

THE NEW-ENGLAND HORSE-SHOW.

This Exhibition, held at Brattleboro', Vt., appears to have been very successful. The entries comprised above one hundred and fifty animals, four fifths of which were different varieties of the Morgan breed, the Black Hawk predominating. There have been exhibitions in which a greater number of animals have been presented, but none, perhaps, in which the value of the stock has been exceeded. Five thousand dollars were to-day refused for either of two magnificent horses which were on the ground. This morning, half a mile, at the rate of 2 min. 14 sec. per mile, was made by a mare belonging to Mr. J. L. Briggs, of Springfield, Mass. A mare belonging to Mr. Twitchell, Superintendent of the Boston & Worcester Railroad, also made most excellent time. The afternoon was devoted to testing the qualities of horses aged and designed for all work, and those of seven years and under, by the rate of speed. None of them made quicker time than that recorded above. The attendance on the ground was liberal.

The afternoon of the second day was devoted to a trial of speed of the various animals present, and thirteen geldings and mares were entered for competition. The following is the best time made during the trial: Missessque Belle, of old Nimrod and Messenger blood, four years old, owned by A. N. Stevens, of Endsburg, trotted half a mile in one minute and twenty-nine seconds; Abdallah, mare, six years old, owned by J. L. Briggs, of Springfield, Mass., one minute and thirty-two seconds; Lady Besworth, by Rattler, four years old, owned by H. H. Thaxter, of Rutland, one minute and twenty-eight seconds; Nelly A. Sherman, Morgan, eight years old, owned by George R. Orcutt, of Middlebury, one minute and twenty-nine and a half seconds. The above four then trotted for the superiority, which was gained by Nelly, who made the mile in two minutes and forty-nine seconds. Lady Besworth came in second, the Briggs mare third, and Missessque Belle last. The premiums were $50, $25, $15, and $10. These matches were very exciting. Flying Morgan, owned by Mr. Adams, of Burlington, trotted a match against time, making the mile in two minutes and fifty-four seconds. Two Black Hawk and Morgan colts, each three years old, owned by Mrs. Hatch, of Bethel, and Grosvenor, of Bridgeport, trotted a mile, the former in three minutes, and the latter in three minutes and three seconds. A pair of mettled horses, respectively four and five years old, owned by Mr. C. G. Lawrence, of Brattleboro', made a mile in three minutes and seventeen seconds.

BABY-SHOW AT SPRINGFIELD, (O.)

Our Springfield (O.) friends are duly noticed by the press, in their efforts to improve the breed of babies. The correspondent of the *New-York Times* says:

"The National Baby-Show took place at Springfield to-day, and one hundred and twenty entries of babies were made.

A letter was received from 'Fanny Fern,' and read for the edification of all concerned.

Letters were also received from Mrs. Swisshelm, Mrs. Crittenden, Mrs. Mott, and Horace Greeley, Esq.

Mr. Greeley thought that much attention should be given to the development of the human constitution, in a country where able-bodied men sold for five hundred to fifteen hundred dollars a piece.

Mrs. Mott thought that black babies should have been admitted to this exhibition and had an equal chance with the whites.

Among the exhibitors was an old woman who came with her seventeenth child. She claimed a premium on that ground."

Another editorial notice contains the following:

"The baby-show at Springfield, Ohio, has puzzled some people amazingly. What was to be achieved by it was a great question, and probably while every proud mother thought how her chubby little one would loom up among the multitude of its own age, like Saul among the prophets, or Cupid among common boys, as the finest by all odds, and deserving of all the premiums, yet most of the childless thought it a very silly affair for men to go into, and even doubted whether it would tend to increase the stock of existing delicacy, or be likely to help men's morals.

It did some good, however, we doubt not. It gave four handsome premiums to as many promising children, which we hope will not turn their heads, when they are old enough to be turned. By the way, these little ones coming so early before the public, are a kind of public property, and we should like to live long enough to note how they turn out. Their mothers should instruct them that, though it is very proper for an awarding committee to pronounce one 'fine' at six months, the wise man of Greece thought none should be pronounced 'good' until they have passed the last bridge of life.

We hope another good will come of such amusing convocations; that children will be recognized as possessing rights. The common doctrine is, that a child has no right to sit in meeting. But why has not a bright-eyed baby the same right to look up in a minister's face at church as for a stupid old over-fed man to lie dozing and nodding in his presence. Why has not an innocent one-year-old as good a right to cry in a place of amusement as for a strapping b'hoy to munch peanuts and cry 'hi! hi!'? Why has not 'Young America' in bib and frock, as good a right to crow or cry in a rail-car as the coarse fellow in the next seat to make puddles of tobacco-juice on the floor, or a vulgar fop to mouth great oaths openly? It may not be in taste for mothers to take their little ones unnecessarily into the haunts of men, but, in there, whether of necessity or not, they have their rights, which we hoped such shows would tend to maintain.

The Springfield affair did some local good, no doubt. It brought in much

company to the city, helped the hotels, improved the milk-trade and did good to the venders of toys, made a topic for the papers and advertised the fathers of the fair."

We copy a part of a very readable report, which we find in the *Cincinnati Times:*

"The managers of the 'show' appeared to be taken aback at the interest taken in the affair. Devoted mothers and doating fathers, with their little pets in their arms, came pouring into the Fair grounds, each, no doubt, confident of leaving it with one of the prizes. A small canvas tent had been assigned as the receptacle of the entries, and into that, mothers, babies, and nurses were ushered by gentlemen wearing rosettes upon their breasts. Soon there was 'music within.'

Astonished, probably, at finding themselves in 'mass meeting assembled,' the little ones set up a cry which shook the canvas-top and pierced the ears of the people. In vain did the brass band toot their instruments, to drown, if possible, 'the piercing cry.' *Young* America was aroused, and scorning to be beat, sent forth notes which shamed the keys of the bugle and made the trombone blush for its weakness.

The tent presented a novel, amusing, and interesting sight. The mothers and nurses were seated, and had the 'little darlings' all ready for inspection, that is, as near ready as could be. To see so many babies together was novel; to note the maternal efforts to present them in the best mood was amusing, and to gaze upon their innocent faces and purest charms was certainly interesting.

There sat a mother, her eyes directed alternately on the judges and on a little cherub which lay in her lap. By her sat another, holding up proudly a lovely little girl, whose flaxen curls and sweet blue eyes would soften the heart of the greatest baby-hater in Christendom. Next to her a nurse was endeavoring to quiet a stout, black-eyed, rosy-cheeked 'one-year old,' who insists on pulling the jet black ringlets of another one about its own age. One lady pointed with pride to the chubby legs of her darling boy, while another glowingly refers to the delicate but well-formed features of her sweet babe. One boasted of having the largest of its age; another of the smallest and smartest. Some of the babies seemed to feel their importance on this occasion, and, in spite of the most earnest entreaties, would be in mischief, and keep up a continual noise. Others appeared unwilling to 'believe their eyes,' and lay quietly in their mothers' arms, watching the proceedings with apparent interest, while others insisted on hiding their innocent faces in their mothers' bosoms, as if they knew their refuge was there.

Then the expressions which fell on one's ear! 'Tome to mudder's arms, mudder's 'ittle pet.' 'Oh! you darling 'ittle toad!' 'B'ess its 'ittle heart, it shall have some tandy.' 'Tot, tot to Baridyboss, on its mamma's 'ittle hoss.' 'Stan' up, muzzer's 'ittle pet.' 'It's sweet, so it is, mudder knows it is.' 'Dump if it wants to, tause it tan dump.' 'Tiss mamma now, won't it tiss mamma?' 'Bouncety bounce, bouncety bounce.' 'Now what a naughty boy; see, the gentlemen are coming.' 'That's a good baby—nurse can tome its hair, an' it don't try a bit.' 'Sweety, sweety, mother's sweet,' and an hundred more just such expressions.

One hundred and twenty-seven babies were entered for exhibition. And they came from almost everywhere.

The judges were a long time in their investigations. After they retired, the mothers, with their children in their arms, walked into the Floral Hall, where they remained, while the spectators crowded past them to take a look at the babies. This ended the great baby show.

Great dissatisfaction was expressed at the award of the first prize. It was even proposed to take up a subscription on the spot, to purchase a gift worth at least as much as the prize. It was understood that her claim had been strongly urged, and that the prize was awarded to the other child by a majority of only one vote.

Those in the minority were determined she should not pass unnoticed, and after the award had been made known, waited on the little favorite, and through Mr. De Graff of Dayton, presented her with a large and costly statuette of our Saviour blessing little children. This act was highly applauded."

It has been suggested, in one of our exchanges, that this committee are little aware what enemies they will have to encounter hereafter, in the one hundred and twenty-six disappointed mothers.

PORTLAND (ME.) MECHANICS' EXHIBITION.

This is reported as very successful the present season. Among the objects of especial interest in the department of labor-saving machinery, the *Portland Advertiser* describes the following:

"We were much interested in the operation of Vogel's Patent Loom Harness Maker, entered by Warren, Pennell & Co., Saccarappa. This machine performs a work which until quite recently was a very slow hand process. Formerly a single hand was expected to make two thousand loops a day. Four of these machines may be tended by one girl, and they will make forty thousand loops a day. The thread of which they are manufactured is drawn from spools set on revolving tables, twisted in pairs, braided at regularly recurring intervals, and wound on a cylinder, which is moved horizontally by proper gear. The braiding forms the necessary loops, and is the result of the ingenious action of a *cam*, which causes the spools to change tables and cross each other. It is a wonderfully ingenious machine.

George Copeland, Lewiston, has entered a loom for weaving seamless-bags. It is an improvement on a similar loom, inasmuch as it makes use of *two* shuttles, by which, and a corresponding adjustment of the several parts, *twilled* cloth is produced. It will turn out a common grain-bag in seven minutes, forming a perfect bottom. It is a machine of great value and ingenuity of construction."

Beside these, we notice two shaping and planing-machines, a cotton-drawing frame, and a cotton-carding engine, all from the Saco Water-Power Company; a rotary-cutting cylinder planing-machine; a blind-shade planing-machine; a saw-filing machine; Edson's double-acting force-pump; a card printing-press; washing-machine; and many other equally useful pieces of of machinery.

The display of paintings is large, and very favorably spoken of. The *State of Maine*, of Monday, says that the Exhibition thus far met with a success surpassing the expectations of its managers. We feel pleased to record this fact, as it shows that there is a proper feeling on the subject of the mechanical skill of our State, and that an interest has been awakened that will hereafter do much to improve and elevate the science of mechanics.

We shall refer again to this Exhibition.

Fig. 1.

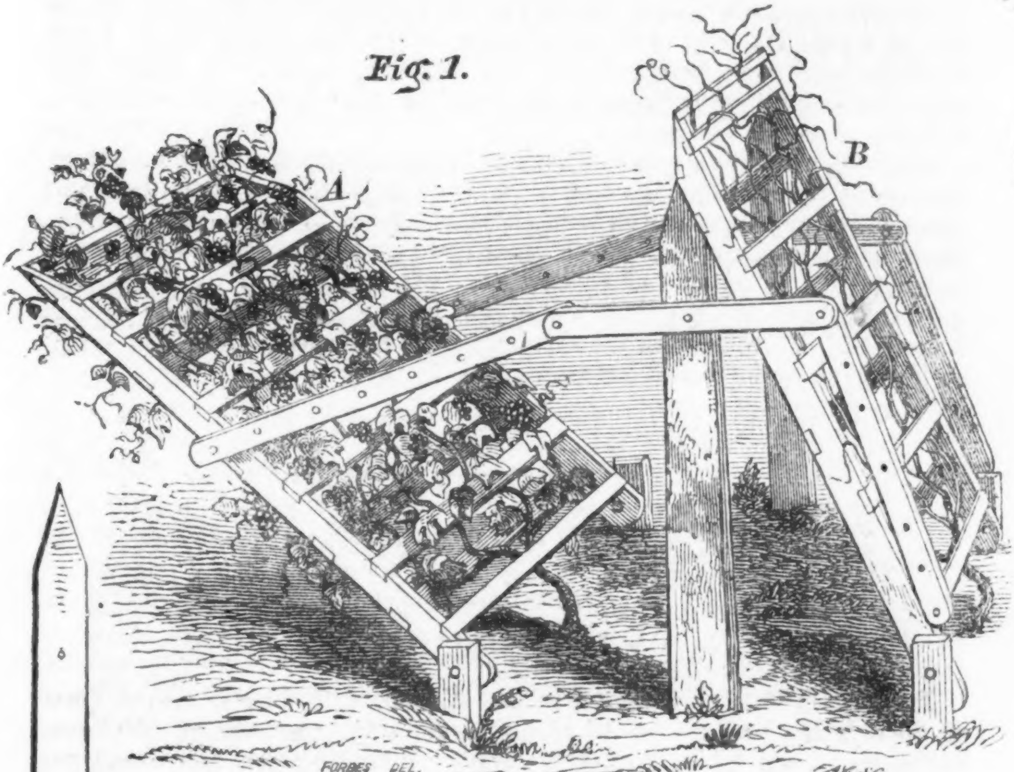
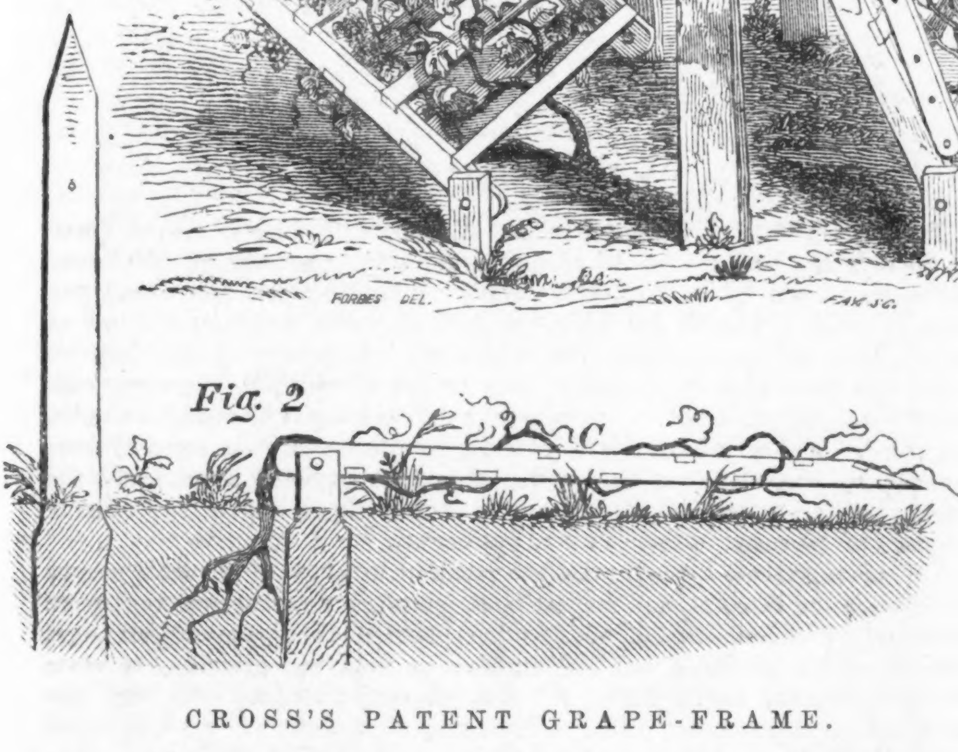


Fig. 2



CROSS'S PATENT GRAPE-FRAME.

The annexed figure represents one of the many forms of the grape-frame for which a patent was granted to S. Oscar Cross, of Sandy-Hill, Washington county, N. Y., on the 27th June, 1854. Fig. 1 is a perspective view, and fig. 2 is a vertical section, showing how the frame can be lowered to the ground for any desirable purpose. Frame A represents a view of grapes grown whilst the frame rested against the posts, and now partially depressed, exposing the fruit to the sun, and bringing the foliage underneath. Frame B shows how the vine is secured within it. C represents the frame as the inventor designs leaving it until the grapes get their growth.

The advantages claimed by Mr. Cross from the use of this frame are, that the vine thus shades and enriches the ground; the rose-bug is not so injurious to fruit and foliage; it is not as liable to mildew; it is not as exposed to blasting winds; it sets in greater abundance; grapes grow larger and faster,

as they receive warmth from the earth, consequently the fruit ripens earlier in the season. In this position it is easily covered to protect from winter-killing; and it can be lowered to this position to protect the grapes from early frosts. It is easily elevated, and held in any position by the supporters. It was designed by the inventor that the frame B should have supported the vine in fruit, which would have given it the appearance just described; but, by an error of the engraver, the fruit is represented as grown, when the frame was elevated and turned against the posts, instead of in a horizontal position. The frame is easily made, wall-strips, or other material, being used to fasten the slats to. If but one set of slats are used, and the vine is not secured within the frame, a few strings will secure it to the frame when its position is reversed. Foot-pieces on the short posts can be dispensed with, as the vine itself will secure the foot of the frame.

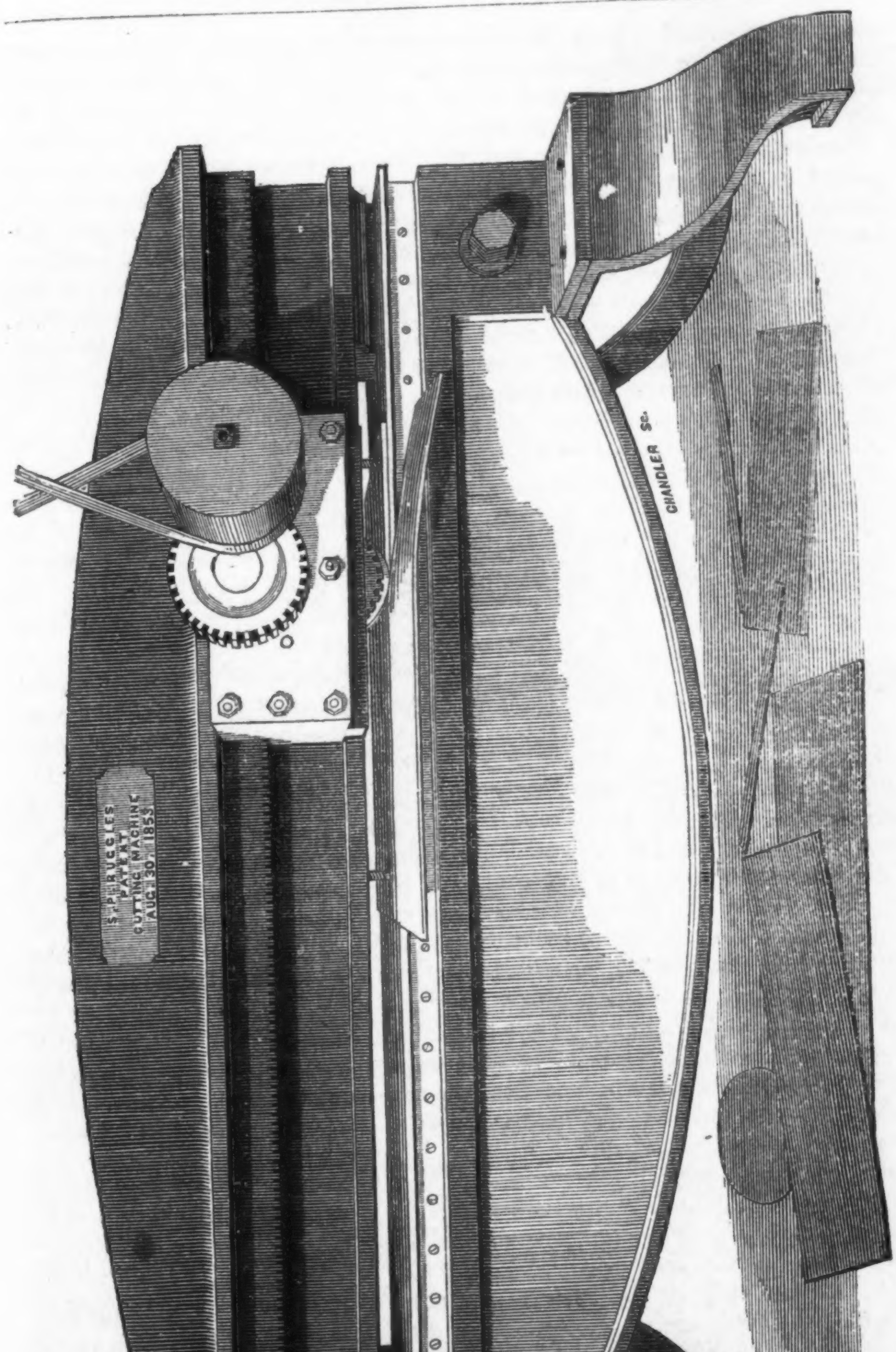
NEW MACHINE FOR CUTTING METALS.

S. P. RUGGLES' PATENT.

THE true method of cutting iron, and thereby extending its uses to many of the arts, has been discovered only since the commencement of the present half-century, and by an American inventor. Until within four years, the colossal power-shears, or jaws, have been the greatest practical triumph of mechanics over the rude efforts of the sledge and cold-chisel. It has been considered necessary that the cutting-blades of shears should touch or pass by each other; and every attempt to cut iron, with the hardest rotary-dish or knife, has failed. Not only have the fibres of the iron to be cut been raggedly rent asunder and distorted, but the cutting edge has crumbled away under the intense pressure required. A new era in iron-working, and in the value of the mineral treasures of this country, has begun.

The cut represents a newly patented machine, which, with but little motive power, cuts the heaviest and longest boiler-plate as noiselessly as if it were paper, at a minimum rate of ten feet per minute, leaving the divided edges perfectly square and true, and both surfaces as level and unwarped as when the plate left the rolling-mill. All the labor of trimming and filing the several edges is dispensed with. Curved lines or straight are cut with equal facility; and the plate is instantly ready to make a square joint, as the side of a boiler, the door of a safe, or the plank of an iron steamer or of a house. A three-inch belt, at half-speed, gives sufficient power to divide the thickest plate; for the edges of the cutting-knives need not come nearer together than half the thickness of the material to be cut. The cold iron falls, as by magic, under the knife.

This great invention has been made by Mr. S. P. Ruggles, of Boston, Mass., whose reputation as an inventor of printing-presses is deservedly world-wide. The efficacy of this machine arises chiefly from a combined motion given to the cutting-wheel, by which it revolves, with mathematical exactness, a certain degree faster upon its axis than it would naturally rotate upon the horizontal plane along which it is made to move—*thus cutting with a drawing stroke*. The power thus given may be felt by a simple experiment


S. P. RUGGLES
PATENT
CUTTING MACHINE
AUG. 30, 1853
CHANDLER Sc.

made upon a wagon-wheel, which ordinarily makes but a slight track on a hard beach. If, while it is slowly moving, a strong hand should lift the hinder spokes, the indentation would be changed into a deep furrow, and this without adding an ounce to the vertical pressure.

Invention reverts, in this machine, as in almost all great discoveries, to first principles. By the combined rotations above described, and the aid of a strongly-toothed horizontal rack, the upper enamel of the plate is divided by the superior knife, and the lower enamel by pressure upon the edge of a lower stationary blade, while the same pressure at the same instant breaks the internal iron. Thus an acute genius among a labor-saving people, returns to and simultaneously effects all the operations of the rudest blacksmith, who first cuts with a cold-chisel the enamel only of his iron bar, and then breaks the internal substance by a blow over the edge of his anvil. This return to nature, or those first principles of rude art which seem to be taught by her, so simple are they, is one of the highest tests of inventive genius.

In the above machine, an arrangement of eccentric bolts, turnable at pleasure, elevates or depresses the rotary-knife, according to the thickness of the metal to be cut. This appliance dispenses with much power, and preserves the metal from the warping and twisting which must take place when the cutting-blades, as in ordinary shears, are crushed into contact or by each other.

This is no theoretical abstraction. Below are the certificates of two practical mechanics:

AMOSKEAG MACHINE-SHOP,
Manchester, N. H., Jan. 18, 1854.

We have been cutting all our boiler-plate, for the last nine months, with one of S. P. Ruggles' Cutting-Machines. It has surpassed our highest expectations, cutting the heaviest plate with great economy of power and saving of labor, leaving a smooth, uniform edge, without warping or twisting the plate. We are satisfied that for power, simplicity, and durability, it is unequalled. O. W. BAYLEY, Agent.

CANTON, Jan. 25, 1854.

MR. E. RICHMOND, Agent: My attention was recently called to witness the operation of a machine invented by S. P. Ruggles, for cutting boiler-iron, and other sheet metals. I was surprised to see boiler-iron cut at one stroke so evenly and perfectly, with so little power and so simple a machine.

I am confident that this is the ONLY TRUE PRINCIPLE FOR CUTTING sheet metals, and would commend its use to all mechanics who desire a machine for this purpose.

Yours, respectfully, LYMAN KINSLEY.

The machine referred to above at the Amoskeag Works, was found so uninjured, after nine months' incessant work on boiler-plate, that the knife, being then for the first time removed for examination, was replaced without grinding, and has never yet required it. A small machine, used by a brass-worker for more than a year, without sharpening, was found upon trial so sharp as to cut note-paper with ease.

By a simple apparatus for circular work, attached to these machines, disks of metal of every thickness, from a cylinder-head to a pot-lid, can be whirled out at a rate to astonish an old-fashioned tinman.

More than usual space has been devoted to the merits of this invention, because few affect so many branches of industry, and perhaps none, since the discovery that coal could be used for fuel, has so much enhanced the real value of the mineral deposits of this country. The high prices of building materials are a matter of anxious moment. Iron has been suggested as a substitute; but the labor of cutting it at pleasure, so as to meet the fickle

whims of builders, has been fatal to a general use of it. But hereafter, on the same grounds of economy and necessity that the bowels of the earth have been ransacked for fuel which its surface is ceasing to supply, iron will be the substitute for lumber. Iron houses will be common, when it is universally known that a machine exists which can be carried to the building-site, and there, by man or horse-power, cut iron planks, in any shape, to order, quicker than the best carpenter can now saw those of wood. This machine does this; and by decreasing a hundred-fold the expense and labor of working up iron-plate, develops new uses for this and other similar intractable materials, and thus will eventually enhance the value of mining property.

Among smaller considerations, no tin, brass, copper, or sheet-iron worker, safe or locomotive-builder, working on old principles, can compete with this great labor-saver. In this country, labor-saving machines do not throw operatives out of work; but, by bringing the commodities that such machines produce within the reach of more consumers, they increase the demand for such articles, and for labor upon such stages of their manufacture as are not effected by the improved method of production.

With one of these machines for cutting pasteboard, and a lilliputian card-press, invented by Mr. Ruggles, and which can be almost packed in a hat-box, any woman or clever boy can cut out of sheet pasteboard and print shop-cards, of any size and device, at the rate of several thousand per hour. This work would afford such persons an independent livelihood, and in this view the invention deserves the careful attention and approbation of every community.

The chief engineer of the Ordnance Department of Great Britain has given his valuable indorsement to this invention, by purchasing for the Woolwich Arsenal, by order of his government, for $1200, the second machine ever made under this patent, for cutting quarter-inch iron plate. Such practical approval is a compliment to American genius.

Machines upon this principle are manufactured of different sizes, and particularly adapted for cutting paper, pasteboard, sheet-tin, copper, tack and nail-plate, boiler sheet-iron, and steel. Their prices range, according to size, from $25 to $1500.

Mr. Edward Richmond, of Boston, Mass., is the agent for the Cutting-Machine Manufacturing Company, who are ready to receive orders at their establishment, No. 152 Washington street.

ENGLISH AND AMERICAN IRON.

Returns give us the following statements. During the four months ending May 5, 1853 and 1854, the export of metals from Great Britain was as follows:

	1853.		1854.	
	Tons.	Value.	Tons.	Value.
Iron, pig,	83,760	£254,180	100,958	£421,608
Do. bar, etc.,	212,831	1,827,081	207,417	1,919,893
Do. wire,	3,083	65,768	2,813	56,618
Do. cast,	18,752	161,073	25,141	243,381
Do. wrought,	50,944	758,892	64,442	1,011,395
Total,	369,370	£3,066,994	400,771	£3,652,895

That England relies upon this country largely as a market for her iron and other metals may be seen by the following extract from the *Derbyshire Advertiser:*

"There is not the least indication of any depression in the iron trade; on the contrary, fresh orders arrive daily, and the Indian and American demand for railways is very great. The inquiry for Scotch pig-iron is as active as ever, and there is no probability of any diminution in price so long as stocks continue to be kept down. The demand for Derbyshire pigs is unprecedented, and much greater than we make. We have many furnaces erecting in the neighborhood of Middlesborough and in the Cleveland district, and when their make is brought into the market it may have some influence on prices. The steel trade is exceedingly active, and orders are plentiful. The demand from America and Germany for manufactured articles is good. The operatives are fully employed and apparently satisfied with their condition in reference to trade and employment. There is a California gold-digging mania raging, on a small scale, in the north of Derbyshire, in consequence of the discovery of the precious metal in the Derbyshire mines. The metals are found in the channel, and the lodestone—the gold—being sprinkled over the stone in little nuggets, so apparent to the observer that it is wonderful that they should have escaped so long."

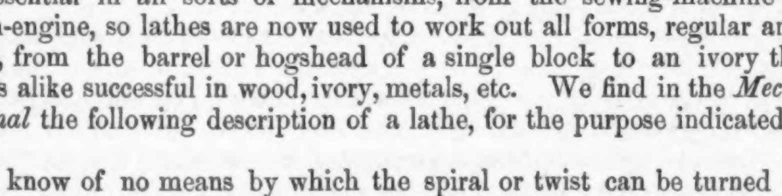
SPIRAL TURNING IN A COMMON LATHE.

The lathe has become a sort of king among tools for the manufacture of implements, as the cam has for working-machinery. As the latter is equally an essential in all sorts of mechanisms, from the sewing-machine to the steam-engine, so lathes are now used to work out all forms, regular and irregular, from the barrel or hogshead of a single block to an ivory thimble, and is alike successful in wood, ivory, metals, etc. We find in the *Mechanics' Journal* the following description of a lathe, for the purpose indicated in our title:

"I know of no means by which the spiral or twist can be turned in the common lathe, unless it is by some of the expensive machines of the party I have named. I now send you a rough sketch of a plan of my own, and which, I flatter myself, will not only be found simple but really useful.

Fig. 1, which I call a screw, or traversing chuck, is in fact, in the original, the body of what is commonly called a patent cork-screw, with the addition,

Fig. 1.

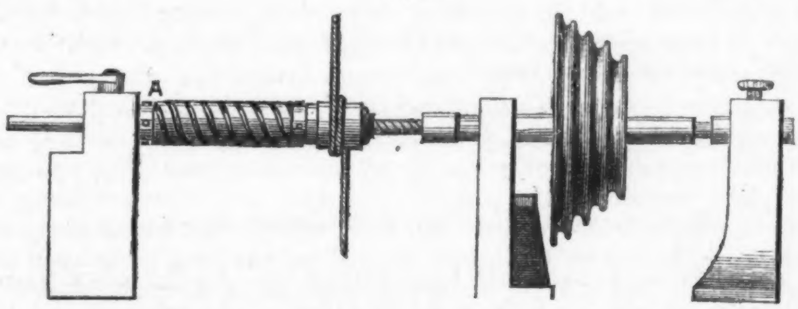


at one end, of a brass socket, with screws to pinch the end of the wood when fitted into it; at the other end is the screw, to screw it on to the mandril. The screw of this chuck, if made much use of, should be manufactured iron, and case-hardened, the number of threads being according to the fancy of the maker; it will work better with several than with only one, and allowed a

traverse of about four inches, quite sufficient for any purpose. The guide-plate in the tube should also be of iron, case-hardened, and the tube itself of tough gun-metal. An instrument of this kind would be of great use in connection with the foot-lathe. The pointer and divisions on the worm require explanation; by this means any twisted column, with its outer surface left flat instead of rounded, as usual, may be ornamented with beads, or with any other device, in connection with the overhead motion, the divisions making a *spiral division-plate*, which, with ingenuity, might be turned to good account, as the means of ornamenting cylinders of any kind spirally, without reference to turning the twist. The screw-pointer and spring are drawn in fig. 1, for simplicity of explanation. The spring should be coiled at right angles to its present position, round the end of the tube, in the same way that the spring is applied to a powder-flask, the pointer to go through the tube as a sure guide.

Fig. 2 is a sketch of the apparatus in use. In this view the chuck is shown screwed on to the mandril, which is now to be stopped by any of the means

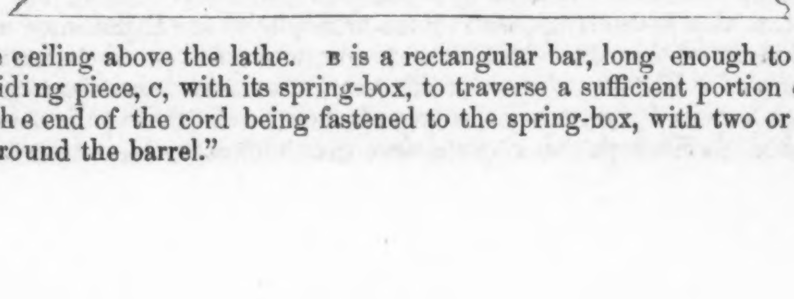
Fig. 2.



used for that purpose; the back-screw of the movable headstock being removed, the guide, A, has free passage to work, the cord, from a temporary pole, being placed round the body of the chuck, which, if made for the purpose, would have several grooves cast upon it for different speeds, and carried down to the treadle, as is usual in a pole-lathe. It is often convenient to have the means of converting the movement of the foot-lathe into the backward and forward motion of the pole.

Fig. 3 is a neat and convenient plan of doing this, and ought to be part of a lathe apparatus. At A are two brackets of wrought or cast-iron, screwed

Fig. 3.



to the ceiling above the lathe. B is a rectangular bar, long enough to allow the sliding piece, C, with its spring-box, to traverse a sufficient portion of the bed, the end of the cord being fastened to the spring-box, with two or three coils round the barrel."

MISCELLANEOUS.

Important Discovery.—The *Gazette Hebdomadaire de Medecine et de Chirurgerie* gives an account of some experiments equally important in a practical as in a theoretical point of view, and from which it results that air passed through cotton no longer produces either fermentation or putrefaction. The journal describes as follows the plan of proceeding of two German savans who have made these experiments: The apparatus made use of is simply composed of a glass globe, hermetically closed by a cork covered with wax, and provided with two tubes, one of which is in communication with one of the extremities of the filterer, which is itself terminated by a small tube at the right angles. The second tube serves as an aspirator; it goes down almost to the bottom of the globe, and communicates hermetically with a gasometer. The globe contains the fermentable substance.

When it has been ascertained that the joints are perfectly closed, the globe is placed in a vessel containing boiling water, where it is kept until the different tubes of communication have become hot, after which a second examination takes place to see that every part remains hermetically close, and the cock of the aspirator is placed in such a manner that the water runs drop by drop. A first experiment was made on muscular meat, with water added; and in order to make a proper comparison, there was placed near the apparatus a second globe containing the same kind of meat, and communicating freely with the atmospheric air. At the end of a fortnight the matter contained in the second globe was in a complete state of putrefaction, while that in the globe which only received the filtered air was not at all changed, and when at the end of twenty-three days the apparatus was opened the meat was just as it was on the first day. From those experiments it results that meat recently boiled, and fresh broth, may be kept thus good for several weeks.—*Chicago Democrat.*

A Sea Monster.—An immense screw and paddle steamer, for the Eastern Steam Navigation Company, is about to be built at Millwall, England. The ways are already commenced, and several hundred tons of iron are ready to be put together. She is to be completed in about two years. Her extreme length on main deck will be 700 feet, length of keel 680 feet, beam 83 feet, hold (forming four decks) 58 feet, length of principal saloon 80 feet, height of ditto 15 feet, tonnage 10,000, or builder's measurement 22,000 tons, stowage for coal 10,000 tons, stowage for cargo 5000 tons; 500 first-class cabins, with ample space for second and third-class passengers, beside troops, etc., while the screw and paddle engines will be of the aggregate nominal power of 2800 horse. She will also carry an immense quantity of sail.

The *London Builder*, in speaking of this vessel, says: "The principle of construction, as designed by Mr. Brunel, will be similar to that of the tube of the Britannia Bridge. Her bottom, decks, and sides, are to be double, and of a cellular form, with two feet six inches between. She will have fourteen water-tight compartments, also two divisional bulkheads running her whole length, so that it would appear as if the principles of the T girder, as we suggested, only in this case doubled, were comprised in the new principles of construction. The great length of the ship, it is contended, according to all present experience, will enable her to pass through the water at greater velocity, with a similar power, in proportion to her tonnage, than ordinary ves-

sels now require to make ten knots an hour, and that speed is, in fact, another result of great size."

The Great Harvesting-Machine.—Truly can it be said, we live in a "great age." It will appear almost incredible when we say to our readers that there is a harvesting-machine, now at work in the Valley of San Jose, that will harvest *twenty acres* per day, and yet such is the fact. We saw it moving on its ponderous wheels, like the great "Car of the Juggernaut," and heads were bowing down before it as numerously, and were crushed as effectually, also—for this machine not only harvests the grain, but threshes, cleans, winnows, and bags it, performing all the work at the same time.

A team of twenty horses takes this mighty wholesale harvester steadily through the field; the knives take off every head clean and carry them over a cloth drum into the thresher, this in turn taking them into the separator and fan-mill, and from thence up a hopper into the bags; these are filled, sewed up, and rolled gently off into the field behind the machine. At the close of the day's work, the harvester looks back and sees twenty acres of headless straw, while the decapitated grain lies over the broad field in well-filled bags, resembling hundreds of large sheep.

This is one of the most wonderful inventions of the age, and the sight of it is well worthy a visit to this great valley. The machine will be at work for some time, and all who feel interested will never regret the trouble it costs to witness it. It is at work upon the grain-fields of Messrs. Horner, Beard, and others, near the Mission of San Jose.—*Cal. Farmer.*

Tomato-Figs.—We have seen and tasted those delightful figs referred to in the following article from Hovey's excellent *Horticultural Magazine*, and indorse all which he says in their favor. We hope that those who raise abundance of tomatoes will save this recipe, and try the experiment, if only on a small scale.

Recipe for Tomato-Figs.—Pour boiling water over the tomatoes, in order to remove the skin; then weigh them and place them in a stone jar, with as much sugar as you have tomatoes, and let them stand two days; then pour off the syrup, and boil and skim it until no scum arises. Then pour it over the tomatoes, and let them stand two days as before; then boil and skim again. After the third time they are fit to dry, if the weather is good; if not, let them stand in the syrup until drying weather. Then place on large earthen plates or dishes, and put them in the sun to dry, which will take about a week; after which pack them down in small wooden boxes, with fine white sugar between every layer. Tomatoes prepared in this manner will keep for years.

A few apples cut up and boiled in the remainder of the syrup make a very nice sauce.—[Mrs. Eliza Marsh.

It is only necessary for us to add, that the Committee of the Massachusetts Horticultural Society awarded Mrs. Marsh the Society's Silver Medal for excellent specimens exhibited November 29. They were tested by the committee, and pronounced to be superior to any they had ever seen. They were put up in small boxes, and to our taste were far better than two thirds of what are sold in our market for the best Smyrna figs.—[Ed. Hor. Mag.

The "Mast."—It is an extraordinary fact, that though the dry character of the season has cut off the late crops, there is a most astonishing mast. The oak-trees are loaded with acorns, and some of them, we are told, will yield ten bushels. These acorns, we are informed by those who ought to know,

for the purpose of fattening hogs are equal to corn; particularly is it the case with the acorns from the white-oak. Where our farmers live in the neighborhood of forests, they will be able to make nearly their usual quantity of pork, especially if they have sufficient corn to feed their hogs a few weeks.

Mast-fed pork is not, however, in as high esteem as that which is corn-fed; but a good deal of the former will be brought to market the coming fall.—*Springfield (Ill.) Journal.*

The past season is said by the oldest inhabitant to have been the driest since the year 1826.

RECENT AMERICAN PATENTS.

Fast Wood-Screw Machine.—Mr. George F. Wilson, of Providence, and Mr. James M. Wiley, of Olneysville, R. I., are the joint inventors of a machine for making wood-screws, which equals in rapidity of execution four of the best machines now employed in that branch of manufacture. The machine is termed the Wood-Screw Rotary Machine, all the principal movements being of a continuous rotary character. Wood-screws, termed screw-nails by some English authors, are usually completed in three machines, one only of which is termed a "wood-screw machine." The first takes wire from the coil and transforms it into "screw-blank" by motions closely analagous if not identical with those of the common rivet-machine. Another machine saws a shallow score across the top of the head, while the main machine, on which all the study and inventive skill is necessarily bestowed, seizes the blank and cuts the proper thread thereon. The thread of a wood-screw is all produced by removing the metal between, there being none of the metal squeezed up as is done by the ordinary dies of the machine-shop, so as to make a screw of greater total diameter than the original wire. The blanks being fed in by by self-acting mechanism, are successively caught by a pair of jaws in a revolving chuck, held firmly by the head, and compelled to rotate steadily in one direction, while a properly-shaped tool is repeatedly pressed against its side, and moved toward the point. Several reciprocating movements are thus necessary, even with a sharp and keenly-adjusted tool, before the thread is sunk to the required depth, and the large amount of "gim-crackery" employed renders the machine far more "ingenious" than simple or efficient. Such, although usually concealed with some care from the gaze of the uninitiated, is believed to be the method by which these useful instruments are generally prepared, and it is certainly that employed in the new machine, excepting with regard to the cutting-tool and its movements. The new machine, like the older varieties, completes the deep spiral crease only by a repetition of shallow cuts, each scraping deeper than its predecessor—one main point of difference lying in the fact that the new machine carries the tool, or rather a series of tools, on a slowly-revolving horizontal wheel—the movement being continuously rotative. This arrangement not only saves the time otherwise lost in the return motion, but avoids the employment of much complex mechanism. A point of equal or perhaps greater importance is gained in dividing the destructive effect on the edges of the cutters between eight tools, (that number being employed in each series,) so that, other things being equal, this machine, once adjusted, would remain sharp eight times as

long as the other. The simplicity and compactness of the rotary, however, allows four machines, so to speak, to be combined in one with decided advantage, so that one of the ponderous constructions, which are some four feet square and three feet high, throws out the finished article with four times the rapidity, and remains in order, from the principles of its construction, something like eight times as long as the older devices.

The machine can not yet be said to be completely in operation—one only, and that one not entirely perfect, having been in motion at the period of our visit. There can be little doubt, however, that this simple although at the same time compound machine is not only a decided improvement over all the devices before proposed for the purpose, but one which will so far facilitate the manufacture of this admirable fastening as to cheapen and diffuse it to a still greater extent than at the present moment.

SAWING-MACHINE.—The vast timber interests of our country is evidenced by the great and universal attention which has been devoted to timber-cutting machines of every description. To the many various improvements in sawing machinery which have already been made, Pinney Youngs, of Milwaukee, Wis., has added another, for which he has taken measures to obtain a patent. It relates to sawing boards direct from the log, and consists in the use of two pairs of saw-guides, attached to vibrating levers—one pair at each end—in such a manner that the guides may be brought in contact with the saw (a circular one) at either end. When one pair of guides is brought in contact with the sides of the saw, the guides at the opposite ends of the levers will be thrown out from the saw at the period when the carriage has moved to the end of its way and receives its return motion, whereby it is enabled to cut both ways, during both the forward and back motion of the carriage. He has also applied a combination of devices for setting the log correctly and quickly.

IMPROVED MAGAZINE, REPEATING AND NEEDLE-GUN. By EDWARD SIDNER, New-York.—The nature of this invention consists in placing below the gun-barrel a peculiarly-constructed barrel, to contain from forty to fifty cartridges, which said cartridges load themselves into a revolving breech-piece, by means of a piston pressing against the cartridges, said piston being worked by a rack, and which rack is worked by the cocking and discharging of the gun.

With this self-loading apparatus it is possible to fire off, in quick succession, one cartridge after the other, without taking the gun from the shoulder, until the whole amount of charges originally filled into the cartridge-barrel are discharged.

IMPROVEMENT IN COMBING COTTON AND OTHER FIBROUS MATERIAL. By JAMES NOBLE, of Leeds, England.—This invention consists of combining two rotating rings of comb or suitably-formed teeth, one ring of teeth rotating within the other, but eccentric thereto, so that at or near one point of the revolutions of the two rings, they come nearly or quite together, or in contact with one another. Above such rotating rings of teeth, and on the axis of the inner of the two revolving rings, there may be a circular frame, carrying bobbins with prepared cotton or other fibres; and such prepared fibres are to be caused to descend to and come between two surfaces, and upon bushes by which they may be placed into the teeth of the revolving rings, while they are in rotation, just in the rear of the point where they come together. Where the rings come together, the fibres are drawn from between the teeth of the rings by drawing-rollers; as the distance apart of the peri-

pheries of two revolving rings increases, the long fibres remaining in the rings will be retained in the teeth of one of the rings, (namely, the outer ring,) and the teeth of the other ring will retain the shorter fibres, which may be removed by a brush. The longer fibres so carried round are lifted out of the teeth and again placed into the teeth of the two rings, and come again to be drawn off by the rollers.

Improvement in Cordage Machinery. By Philos B. Tyler, Springfield, Mass.—This invention consists in connecting with the bobbins or spools a variable friction, which shall keep up an exact balance or resistance, or nearly so, at all times, without regard to the unevenness of the yarn, or the quantity of yarn on the bobbin, working with equal facility upon a rough and uneven thread as upon one smooth and even, and when the bobbin is full, or when it is nearly wound off, laying all the strands into the cord under an equal tension. When the bobbin is not placed in a flyer, but the yarn or thread is required to be drawn off, under an even tension, a simple standing-frame may be substituted for the flyer, so that the lever and spring, and friction-brake, may be brought to bear upon the bobbin with the same effect as when the bobbin is on a flyer, and in motion.

I claim the regulator, substantially as above described, wherein the tension of the strand so acts upon a friction-brake as to make a uniform resistance, and consequently a uniform tension of the strand or thread.

Improvement in the Preparation of Collodion for Photographic Pictures. By James A. Cutting, Boston.—The nature of this invention consists in the use of gum-camphor in addition to the exciting materials in the preparation of collodion for positive photographic pictures on glass. In a pint bottle introduce twelve ounces of collodion; add to it one drachm of iodide of potassium dissolved in alcohol; then shake the mixture thoroughly and add thereto eighteen grains of refined gum-camphor, shaking the mixture again until the whole is combined, then allow it to settle, when it is fit for use.

Improved Bevelling Plane. By M. J. Wheeler, G. W. Rogers, H. W. Pierce, and M. B. Tidey, Dundee, N. Y.—The object of this invention is to plane a double bevel, or, in other words, to plane two faces at any desired angle to each other, and to a third face. The invention consists in attaching the two cutters which are to plane the two faces, to two wings, which are both hinged or otherwise attached to the body of the plane, so as to swing round a common axis, and each of which is adjustable and capable of being secured in any position, independently of the other, so as to bring and set the faces of the cutters at any angle to each other, or to the fence which is employed to guide the plane.

Improvement in Ornamenting Metallic Buttons. By Hiram W. Hayden, Waterbury, Ct.—The nature of this invention consists in forming a concave die in such a manner that it operates on the whole of the surface to be deadened, and the surface of the die being entirely removed at those parts that require to be bright, they are left of the original brightness of the metal, and then another die, composed of punches, each ground and highly polished in the required prismatic forms, is impressed into the bright parts of the button, forming flat prismatic reflecting surfaces; the whole button thereby having as good, if not better, appearance than those buttons chased by hand, and by this means about thirty gross of buttons can be done in the same time that about two gross can be chased by hand.

INTERESTING TO BUILDERS AND BRICKMAKERS.—A new and important method in the manufacture of bricks has just been patented at Washington, which is destined to effect an important reduction in the cost of erecting buildings in which this material is used, and now-a-days there is no building where brick does not form a component part. By this new method, introduced by Baron de Palm, to whom the patent has been granted, houses can be built of sound, solid brick walls, at a price, we are informed, not exceeding that of an ordinary frail wooden tenement. This fact, when considered in relation to the extraordinary high rents now paid, and occasioned in a great measure by the prices of building materials, is a consideration of no ordinary magnitude. When the kilns or furnaces are put in operation for the manufacture of bricks under this process, it will doubtless attract the attention of practical men, and effect a great change in the cost of buildings of every description. The peculiarity in the making of bricks under this patent consists in the construction of the kiln. The arrangement is novel, consisting of partitions and sub-divisions in the kiln, where the baking is carried on, and by a series of registers the heat is conveyed from one compartment to another without any waste. There is little or no loss of unbaked or overburnt or vitrified bricks, and a surprising saving of fuel. The cost of fuel, and of the waste of material and labor, under the old system, more than doubles, and probably more than quadruples the cost of bricks when pronounced ready for market in the old kiln. The fuel question now engrosses largely public attention, and vast quantities of pine, hickory, and other woods now consumed in the burning of bricks, will under this patented mode be economized to the extent of two thirds of the present consumption. It, therefore, is a subject of interest and importance, both as to public and private economy. Beside the making of bricks, the kilns can be used for the baking and hardening of all kinds of pottery, and will cheapen in a large degree the manufactures of that description. The patentee, we are told, has secured his patent-rights in England, France, Belgium, Holland, and Germany, besides the United States. Several eminent architects in London and Paris have testified to the importance and value of the patent, and several well-known brickmakers at Washington have given highly favorable certificates of the usefulness of the new kiln. Among those who have examined the patent with a view to test its scientific results, is Professor Charles T. Jackson, of Boston, who says: "I am of opinion that this new kiln is a valuable improvement adapted to the thorough and efficient baking of bricks and pottery. I am also of opinion that the kiln is admirably adapted for the baking of ornamental brick-work, hollow bricks, and chain-pipes, such as can not be baked in ordinary open kilns."

IMPROVEMENT IN FOLDING AND MEASURING CLOTH. By WM. C. WRIGHT, Boston.—I claim, first: making the folding-table of a machine for folding and measuring cloth, to move with a reciprocating motion, so as to make the folds and determine their length, and also the making said motion adjustable, in order to change the length of the folds to be made and measured.

Second. I claim the combination of the moving folding-table operating as above specified, with the guiding folders and the elongated holders to each side of the table, for folding and guiding the cloth to be folded, and holding it as herein above set forth.

Third. I claim making the said holder adjustable upon the ends of the folding-table, so as to accommodate different lengths of folds, as herein above set forth.

Fourth. I claim relieving the cloth when folded from the folders and holders, so that it may be removed from the folding-table by raising all of them simultaneously by means of the treadle connected to the said folders and holders through the mechanism herein above described, or in any other way substantially similar.

IMPROVEMENT IN PADLOCKS. By STEPHEN WHITE, Newark, N. J.—This invention consists in making the rear end of the sliding-bolt, when used in combination with the turning-bolt, with a shoulder on the lower edge, which, when the bolt is thrown forward, permits the rear end of the said bolt to descend, so that the said shoulder shall prevent its running back, unless the rear end be first lifted up by the action of the key to clear the shoulder.

What I claim is, making the sliding-bolt with a shoulder, or its equivalent, acting substantially as specified, in combination with the turning-bolt, both entering the mortise of the shackle in opposite directions, substantially as specified, and for the purpose set forth.

IMPROVEMENT IN THE FURNACES OF STEAM-BOILERS. By JON. AMORY and WM. P. PARROTT, Boston.—This invention consists in improvements designed for the purpose of effecting a saving in the quantity of fuel consumed in heating locomotive, marine, and other steam-boilers, and are more particularly applicable to "Baker's steam-boiler furnace," so called. This desideratum of economizing the fuel, is effected by supplying the fire-chamber with hot air instead of cold air, thereby rendering the combustion of fuel more uniform and perfect. In Baker's furnace, the unconsumed gases and other volatile products which emanate from the fuel, are retarded in their passage to the chimney by a series of reverberatory chambers, of semi-elliptical form, leading from the fire-place through which the said products are circulated, and retained long enough to exhaust their heat, deliver the same to the boiler, and insure their perfect combustion, before they are permitted to escape. Taking advantage of this circumstance, we are enabled to convey hot air instead of cold air to the burning fuel.

The second improvement consists in conducting out of the furnace the carbonic acid, or other heavy and incombustible gases, by inserting a pipe which communicates at one end with the bottom of the furnace, and its other end with the smoke-flue.

We claim conducting off the carbonic-acid gas, or other heavy and incombustible gases which check combustion, by means of a pipe which communicates with the bottom of the furnace, at or near one end of the same, and with the smoke-pipe or flues as above described.

IMPROVEMENT IN GAS AND LIQUID REGULATORS. By THOS. H. DODGE, Nashua, N. H.—This invention is intended to be principally employed as a gas-regulator, to regulate the consumption of a number of burners, by causing the pressure on each that is lighted to be uniform, and uninfluenced by the number of the others that are lighted, or by the pressure on the main. It is also adapted to regulate the flow of fluids at a given pressure, without regard to the quantity used, or any variation in the size of the outlet, or in the pressure on the main or inlet.

The invention consists in the employment of two chambers, placed side by side, and communicating with each other at the bottom through an open passage, and at the top by a passage which is opened and closed by a valve attached to a float which is placed in one of the chambers, to be acted upon by water, or the liquid contained in the lower parts of the chambers. The chamber containing the float is in communication with the outlet where the

gas or fluid is consumed or discharged, and the other chamber receives the inlet-pipe. The pressure of the gas or fluid on the surface of the water or liquid in the inlet-chamber, forces the water or liquid upward in the outlet-chamber, in which the pressure varies, according to the number of burners lighted, or the area of the outlet, and thus causes the water-level to vary, and the float to give the valve a suitable amount of opening. The float and valve are also influenced by variations in the pressure in the inlet-pipe, so as to contract the opening of the valve when the pressure increases, and *vice versa.*

I claim the employment, for regulating the flow of gases and fluids, of two chambers having communications at top and bottom, and being partly filled with water or other liquid, and furnished with a valve and float, all arranged and operating substantially as described.

Improvement in Bank-Locks. By Wm. Hall, Boston.—This invention has particular reference to the construction of the key itself, or that part of the mechanism which is employed to arrange the tumblers and shot the bolt. The lock to which it is applicable is a double-acting tumbler lock of ordinary construction.

I claim the slotted slides, which are allowed to arrange themselves upon the steps of the former to form the bits of the key, in combination with the pin or its equivalent, when the tumblers are operated by *turning* the key, whereby the tumblers are rendered inaccessible to any instrument that may be inserted at the open key-hole, and the latter is closed whenever the key is turned so as to bring the slides to bear upon the tumblers.

Improvement in Gas-Burners. By Wm. Mallerd, Brooklyn, N.Y.—The nature of this invention consists in making the gas-burners called fish-tails, cockspurs, argands, or bat-wings, of a material not heretofore used for the purpose, which material is designed to resist all corrosion to which gas-burners are exposed, and which injure and destroy all gas-burners now ordinarily in use, made of iron, brass, or other material.

The gas-burners are, for this purpose, in that part exposed to the flame, made of block-tin, substantially unalloyed; for the tube, any metal, thickly coated with tin, will answer, and prevent corrosion at the point where it is connected with the tip. The tip and tube are connected, by the aid of a blow-pipe, without any solder.

Improved Double-Acting Force-Pump. By John H. McGowan, Jr., Cincinnati, Ohio.—I claim the combination of an air-chamber communicating with the pump above all the valves, with a vacuum-chamber communicating with the pump below all the valves, whereby the elevation of water is rendered more equable and effective, with a saving of power as herein set forth.

Improvement in the Manufacture of Wooden Buttons. By L. L. Platt and A. L. Platt, Newton, Ct.—This invention relates to a new and useful improvement in wood buttons, and consists in compressing the blanks or circular pieces of wood, so as to render the wood compact and dense, and causing the buttons to be as strong and durable as those manufactured from bones.

We claim manufacturing wooden buttons by cutting the "blanks" from slabs which are of a greater thickness than the buttons are intended to be, and reducing said "blanks" by *pressure* to the desired thickness, for the purpose of forming durable and well-proportioned buttons, as herein set forth.

IMPROVEMENT IN MACHINES FOR CUTTING BRADS. By WM. J. MILLER, Cold Spring, N. Y.—This invention is for certain improvements in machinery for cutting brads, lath-nails, and others of similar character. Such brads and nails are cut from a sheet or ribbon of metal of a width suitable for making the length of one brad and the head of another. The dies for cutting must be of such shape as to give the proper taper; and in order, therefore, to maintain a fair edge during the cutting up of the strip, the heads are formed alternately on each side.

I claim the arrangement of the vibrating shear in relation to the revolving shears or cutters as connected, so as to change the position of the cutting edge of the vibrating cutter, and cause it always to stand parallel with the edge of each revolving cutter until the nail has been cut off substantially in the manner set forth.

IMPROVED CARRIAGE AXLE. By WM. H. SAUNDERS, Hastings, N. Y.—I claim the combination of a taper-axle having an enlargement at the root, with a box having an inside similar enlargement at its rear, and a diminution of size outside, provided with eccentric rings or grooves for allowing it to be wedged in the hub, the whole being for the purpose of strengthening the axle without enlarging the box, and enabling me to use smaller hubs, with a sufficiency of wood therein to preserve the necessary strength, substantantially as represented.

IMPROVED CALIPERS. By PERLEY SEAVER, Oxford, Mass.—The nature of this invention consists in making the caliper with a sliding cam or wedge to be operated by a nut, and playing against cam or cams, or projections on the sides or jaws, to move them with facility, and give firm support to the jaw at all times.

PROCESS OF ENGRAVING OR PRINTING UPON GLASS. By MILTON D. and LYMAN W. WHIPPLE, Somerville, Mass.—The first part of this invention consists in causing a metallic cylinder, having the desired figures or letters engraved thereon, to roll in contact with the surface of glass to be engraved, emery, either dry or mixed with water, being kept constantly at the point of contact between the two.

Those portions of the cylinder which are engraved or countersunk below the surface produce no effect, but that portion of the cylinder which is unengraved presses or grinds the emery upon the glass. The surfaces thus produced being more or less rough according to the fineness of the emery.

IMPROVEMENT IN THE PREPARATION OF ARCHIL. By JONAS EBERHARDT, Philadelphia.—This invention consists in taking the extract of archil and combining it with a given quantity of calcined magnesia, according to the shade to be produced. When these ingredients are well mixed together, color can be prepared at any time for the purpose of printing, by thickening the compound with an addition of gum-water; the greater the quantity of gum-water the lighter the shade will be.

To produce the dark shade, the following proportions are required: 32 of extract of archil; $4\frac{1}{2}$ calcined magnesia; 34 gum-water. When printed, the impression is steamed and washed.

I claim the production of a bright and clear steam-purple, without the use of any acid, after its being printed and steamed, as herein described, using for the purpose the aforesaid method.

NEW ENGLISH PATENTS, ETC.

Irish Flax Production.—In a paper in the August number of the *Journal of Industrial Progress*, there are some interesting facts connected with this subject. In 1841, the area of flax cultivation was about 58,000 acres, while, in 1853, the flax crop covered 175,495 acres; that is, one acre in every 76 of arable land. It is estimated that 600,000 acres might be advantageously devoted to this cultivation, and that the produce of this number of acres would furnish about 150,000 tons of fibre, or about 40,000 tons more than the present consumption of the United Kingdom. Consequently, if the Irish would exert themselves, they might cut Russia out of her market. At present, Russia supplies us with nearly 70 per cent of the whole amount of flax imported, the total annual importations being upward of 81,000 tons, having an average value of £70 a ton. Taking the total annual consumption of flax in the United Kingdom at 110,000 tons, 73 per cent of which comes from abroad, it is somewhat strange that the Irish growers have hitherto wasted the seed, having adopted the practice of steeping the flax without separating it from the plant. Half a million sterling may be set down as the annual loss by this practice. In Turkey, Sicily, and other countries, the plant is grown for the sake of the seed alone, and they choose to throw away the fibre. The Irish growers have, consequently, to import seed. What comes in for this purpose, and for crushing, amounts altogether to 630,470 quarters, value £1,387,000. The Society for the Promotion of the Growth of Flax in Ireland have issued circulars and placards pointing out the importance of saving seed for next year's sowing, taking into consideration the probability of little Russian seed being obtainable. Mr. Roche, M. P., has 2500 acres of flax, and he intends to save the seed of the whole crop. Mr. Turnbull, of Rose-mill, Dundee, has written to the Society to say that he has discovered the secret of treating flax-straw, and that he can make very fine fibre from straw which would yield only a middling article by other modes of treatment. He has also invented an easily-managed scutching machine, which is worked at a cheap rate, and gives from 10 lbs. to 22 lbs. of fibre from 100 lbs. of seeded straw. Taking seeded straw at £4 a ton, the flax can be brought to market under £40 per ton.

Willison's Double-Acting Threshing-Machine.—A threshing-machine, on Mr. Willison's patent, recently made by Messrs. Taylor, of Ayr, for Mr. Willison, of Parish-holm, Douglas, gives working results apparently far superior to any hitherto obtainable by machines of the old form. This particular machine is 3 feet 4 inches in breadth, being somewhat larger than an ordinary two-horse machine; yet it is worked easily by a water-wheel only 7 feet in diameter. It threshes a "stook" of 12 sheaves of heavy grain in three minutes, the water-wheel buckets being all the while but half filled with water. It has been suggested, that machines even of this diminutive size are quite large enough for all possible purposes, inasmuch as they can thresh grain faster than one feeder can supply it.

Dr. Arnott's New Fire-Place.—We lately inspected one of these new fire-places. Their construction is very simple, and their management easy. Their appearance differs little from that of an ordinary fire-place. The back and sides are of fire-brick, and the grate is fitted with a box beneath, to receive the charge of coals for the day. The box is open at the top, and the

fire is lighted in the usual way, ignition only taking place amongst those coals through which there is a draught; namely, those which are on a level with the bars, but not amongst those in the box below. As often as the ignited coals burn away, the fire is supplied with fresh material by raising the box with its contents. This is very easily done, by a contrivance in which the poker is made to act as a lever. Above the fire, a plate of metal is so arranged that the heat is reflected into the room, instead of being allowed to escape up the chimney. In the flue, there is a valve or damper, which can be turned by a handle, brought out in front, the object, of course, being to enable persons to increase or diminish the draught. Fresh air, direct from the atmosphere, is conveyed by a channel underneath the hearth, where it is warmed previous to its entering the room. The advantages of this construction of grate are said to be a saving of fuel, consumption of smoke, and retention of heat in the room, combined with good ventilation. Dr. Arnott has not thought proper to patent his invention, and it may be feared that persons will be making grates, to which they will attach his name, without taking care that they possess the advantages of the one we have noticed.

New Build of Steamer.—Mr. George Mills, of Glasgow, has lately patented an entirely new form of steamer, intended to ply on the Clyde with passengers. He purposes to proceed forthwith with the building of a vessel 150 feet long, with an extreme breadth of 32 feet. Both ends will have the usual shape of the bow, and the general form of the whole will be that of a vessel cut vertically from bow to stern; the two divisions made perfectly water-tight, and placed a little apart, and then bound together, first, below the water at the keel, and again at the deck, which will run flush over the whole vessel. It will be understood, from this description, that there will be a waterway right through the vessel, and in the middle a large paddle will be placed, working in a plane parallel with that of the vessel's length. At each end will be stationed a smaller paddle, working transversely by donkey-engines. The latter paddles will be used only when a side motion is desired. The intention of this arrangement, the practical effect of which only trials with a perfect vessel can enable us to judge of, is to move the steamer in every possible direction within a confined space; for instance, in harbor, or at piers crowded with other vessels, or in the sharp turns of a narrow river.

Manual Labor *versus* Machinery.—One of those mistakes in political economy, which are continually occurring amongst an unenlightened people, has lately been made at Barcelona, in Spain. We allude to the orders which have recently been given by the authorities to the cotton manufacturers of that city, to discontinue the use of self-acting machinery, and to convert the machines into hand-mules. This order has been made with a view to conciliate the operatives, who are too short-sighted to see that such a measure is calculated to do them injury in place of good. Of course, it is altogether counter to the spirit of free trade, and could not have even the least show of favoring those who seek it, if the competition of the foreigner were not prevented by restrictive duties. The first effect of the measure will be, to render the manufactured articles dearer than they were previously, and this will lessen the demand; that is to say, consumers can not satisfy their needs in consequence of the advanced price. Next, manufacturers' returns being diminished, capital will be withdrawn from the business, and then what becomes of the laborer when the fund out of which he was paid is removed? It is plain enough, that he must suffer by the very measure he adopted to better himself.

Life-size Sun Portraits.—Mr. J. E. Mayall, whose ingenious apparatus for producing the beautiful "Crayon Daguerreotypes," and which we described some time ago, has at length succeeded in obtaining photographic portraits of the size of life. The apparatus employed is of an immense size, the lens being one of the largest double achromatic lenses in existence, and the result is only obtained at the expense of very careful manipulation, combined with comprehensive arrangements. The mere production of a picture of a large size, would in itself be nothing unless accompanied by greater excellence and artistic effect; but Mr. Mayall's life-size portraits seem even to be without certain peculiarities and distorted appearances to be met with in most miniature photographs. A very few more strides of improvement and extension in this fascinating art, will soon reduce ordinary portrait-painters to the mere drudgery of coloring, finishing, and mounting the productions of their incomparable master, the Sun.

Preparing Skins for Tanning.—E. V. F. Kemaire, of Paris, has patented an improvement in tanning, which is thus described: The skins are first soaked and hung up in a dry chamber, heated to about 72° Fah. by steam. After remaining in this chamber for half an hour, they have distributed over them, by perforated tubes, a very alkaline solution of soda; this is repeated twice—half an hour between the operations. Afterward, at the same intervals of time, streams of water are caused to fall upon the skins until they are well cleansed, and are considered prepared in a superior manner for the other common processes of tanning.

Imitation Leather.—Heiman Khonstam, of London, has secured a patent for the following mode of making imitation leather: Into a quantity of thoroughly boiled linseed-oil mix a quantity of lamp-black, sufficient to form a thick paste, taking care to stir the mixture well, so as to thoroughly incorporate the two ingredients. Then spread on the linen, woollen, or cotton cloth, which is to form the body of the imitation leather, a coat of this paste, and suffer it to dry, after which it is to be rubbed smooth with pumice-stone. Second, third, and fourth coats are then added, each of them containing less lamp-black than the first. After the last coat is thoroughly dried and rubbed down, it is to get two coats of varnish made with boiled linseed-oil and the sulphate of zinc; after which it may be enamelled, and resembles glazed leather.

Boiling Oils in a Vacuum.—John Webster, of London, has taken out a patent for subjecting oils and varnishes to heat in a vacuum, instead of a vessel exposed to the atmosphere. In boiling oils and varnishes over a fire, many accidents have taken place from a flame being brought in contact with the escaping gas from the kettle containing the oils, etc. This method of boiling these substances in a vacuum will obviate this evil.

Thermography.—This is the designation bestowed by M. Felix Abate on a method lately discovered by him for transferring figures and tracings, whether natural or artificial, to wood, calico, and paper, directly from the objects themselves, provided these possess or are capable of being converted into plane surfaces.

This invention is an offshoot of the mode employed in Birmingham and Sheffield for transferring raised patterns, such as lace to metal, by means of pressure; a process since developed in many applications of great beauty both here and at Vienna, under the name of *nature-printing;* and which consists in taking impressions in lead, a soft alloy, gutta percha, or other

suitable material, from natural objects, a flower, feather, etc., by pressure; then obtaining metallic electro-plates from these impressions, and finally printing from these electro-engraved plates in the ordinary way.

But, instead of this transfer of the figure from the natural object, say a feather, to the soft metal, thence to an electro-copper plate, and at last to the paper, M. Abate proposes to print directly from the objects themselves; and has exhibited to the Society of Arts some imitations of veneer and of inlaid work taken on sheets of wood, calico, and paper, and which he states were procured by the following process. The sheet of veneer or inlaying to be copied is to be exposed for a few minutes to the vapor of hydrochloric acid; the inventor names also sulphuric acid vapors, but this must be a mistake, this acid not emitting fumes at common temperatures; or it is to be damped with either of these acids diluted, and the excess of moisture carefully wiped off. The sheet of veneer is then laid upon one of calico or paper, and an impression struck off by a common printing-press; this impression remains invisible until, as with many of the sympathetic inks, it is exposed to the action of heat, which is to be applied immediately after the sheet is printed off, when a perfect impression of all the marks, figures, and convoluted lines of the veneer is instantaneously produced. This may be repeated for an almost indefinite number of times, wetting the veneer occasionally with the dilute acid, without the impression growing fainter. The designs thus produced all exhibit a general wood-like tint, most natural when oak, walnut, maple, and the light-colored woods have been employed; the darker woods, as mahogany, rosewood, etc., may be printed on cloth or paper, dyed or stained to a light shade of the ground color of the particular wood.

These impressions show an inversion of tints in reference to the original wood—the light parts being dark, and *viçe versa;* but this does not interfere with the general effect. Should, however, a true image be desired, the inventor damps the wood-surface with a solution of ammonia, and then prints on the cloth or paper previously wetted with the dilute acid, and exposes to strong heat as before, when, he states, the effect will be a true representation of the wood.

This process is a very simple one, but as yet evidently limited in its application. We think, however, that this process will be useful in a decoration, since it obviously affords us the means of multiplying, at very little cost, accurate copies of rare and costly woods, marquetrie, mosaic and inlaid work generally, the which may be used for paper-hangings, as wainscoting and panelling; or, if well varnished with hard varnish, serve for many descriptions of "occasional furniture," toys, and boxes of various kinds, for which purpose choice veneers are now employed; and thus furnishing a great variety of cheap and tasteful things at a cost within the reach of people of limited means.

M. Abate also describes another process he calls METALLOGRAPHY, or printing on metallic surfaces from engraved wood blocks. In this process the block is damped with a solution of such salts as are decomposed by contact with certain salts. As, for instance, the salts of copper, antimony, etc., applied to the block, and printed on zinc and tin; or of hydro-sulphuret of ammonia, on copper, brass, and silver; salts which deposit either an adherent metallic pellicle, a film of colored metallic oxide, or stain the metal by the formation of a sulphuret, thus producing the figure cut on the block as in ordinary printing.—*London Critic.*

Castings of Malleable Iron.—Mr. R. A. Brooman, of London, has taken the patent for this invention, which consists of an improved method of preparing wrought iron, so that it may be capable of being poured or cast into moulds for the production of malleable castings, or articles which shall have all the strength and qualities due to wrought iron. The invention is designed chiefly for the manufacture of railway wheels; but it is equally applicable to the production of other articles. Scrap or wrought iron may be employed, or bars or plates cut into small pieces, and it must be melted into crucibles such as are used for melting blister steel. To a charge suitable in amount to the crucible of one half of one per cent of charcoal by weight, one per cent of manganese and one of sal ammonia is added. The whole is covered from the atmosphere, and melted in a temperature of about 1500° Fahrenheit, which temperature is maintained for three hours. The metal is then poured into moulds. Other carbonaceous matters may be substituted for charcoal. The iron thus cast will, it is stated, be malleable, so as to be capable of being treated under the hammer in the forge, and formed into other shapes, and thus also part of the iron may be shaped in moulds, and part completed by forging, so as to produce intricate shapes and ornamental work.

Renewing the Teeth of Files.—In our Crystal Palace are shown several patented modes of renewing old files. Here is a method patented by E. Gilbert, of London: The teeth are renewed by a corrosive agent applied to the surface of the file. The files are first cleaned from any superabundance of greasy matter, and then placed in a rack inside a bath composed as follows: With one pound of unslacked lime mix two pounds of potash in one gallon of water, stir the whole intimately together, allow it to remain till three fourths the liquid has passed off by evaporation, draw off the remaining quarter of a gallon of liquor, and allow it to cool. In this liquor the files are to remain four hours, and are then to be removed and brushed, cleaned in clean water, and made quite free from grease, and then immersed in a vertical position, in a mixture of one part of sulphuric acid, diluted with two parts of water. The biting action of the acid attacks the whole surface of the files immersed; the continued effect of which is to deepen the several cavities between the cutting points of the teeth, which become as sharp as they were originally. The files must be immersed for from three to six hours or upward, according to the fineness of the files and the strength of the liquid. The files must be withdrawn and brushed from the oxide formed, five or six times during the process. The patentee states that the process is at once comparatively inexpensive, and removes so little metal, that it may be repeated three or four times on the same file, and thus it will render it advantageous to wear files much less than usual before renewing.

Railway Wheels. W. Morrison, Bowling. *Patent dated February 18, 1854.*—This invention relates to the formation of cast-iron railway wheels, each in one solid piece, with a concentrically corrugated disc, or body portion, instead of spokes. The disc, the rim or tyre, and the nave or boss, are all cast in one piece, either with a chill for the tyre, or not. The corrugations, which may be of various transverse sections, and either simply undulating or angular, or composite, are concentric with the wheel's nave, and are formed in the plane of the wheel's motion, or at right angles to the axle. This system of construction insures the obtainment of a sound wheel, running smoothly and easily when at work.

The nave or boss is cast plain, or with but a slight ornamental moulding or bead upon it, the internal portion being cored out, or formed with an annular cavity, so as to render the absolute sectional thickness of the wheel more uniform, and at the same time save metal, whilst an extended and effective bearing upon the axle is secured. The solid disc portion of the wheel is cast in one piece, both with the boss and the rim or tyre part. This disc portion is of solid metal, of greater or less thickness, according to the diameter of the wheel, or the peculiar class of work for which it is intended. The two semi-circular corrugations are blended into each other, to form a uniformly and symmetrically curved face, presenting a handsome appearance when the wheel is in use. By the adoption of this shape of wheel-disc, several advantages are secured, as well in the primary cost of production of the wheel, as in the ease of action and the durability of the wheel in running. The pattern is of simple form, and it is capable of being moulded with very great facility, as it leaves the sand easily, whilst it furnishes a good impression of its contour. Again, in cooling, the undulatory or wave-like form of the corrugations allows each portion of the disc to work freely and regularly, so that all distortion and contractile injury is avoided. The corrugations, or concentric bends, may be of various dimensions or pitches, and two or more pitches may be combined in one disc, with an effect similar, or approximating, to that derived from the special form represented. Or, instead of curvilinear corrugations, the departure from the pure plane of the disc may be in the form of a zigzag; or, in other terms, it may be angularly corrugated; or such angular corrugation or divergence may be combined with curvilinear forms, producing what may be termed a differential corrugation. But it is preferred to form the disc in the manner delineated and described, as being simple in form, more easily made and managed, and producing a far superior effect in practical working. In some instances, it may be preferable to lighten the wheel by casting, or otherwise producing, holes or spaces in the disc; and these spaces or apertures may be either such as to cause the disc to have the appearance of a fair solidity, merely varied by perforations, or the spaces may be so far enlarged as to bring the disc to a spoke-like form, the spaces, in this latter case, being so extensive as to bear a large proportion to the disc area.

Safety Floating Dress. J. H. Johnson, Lincoln's-Inn-Fields, and Glasgow.—This aquatic vestment has been patented in this country on behalf of M. Mazard, the inventor. It consists of a body-piece, and leggins of waterproof material in one piece, and with as few seams as possible. The leggins terminate in boots of caoutchouc, to which leather soles are attached. Arms are attached to the body of the dress, and these terminate in gloves. All the parts are joined together, so as to prevent the slightest ingress of water, and the only opening is at the neck, which is made sufficiently large for the entrance of the wearer, it being drawn as close as possible by a string, after the dress is put on. Increased buoyancy is obtained by the addition of a zone or belt of water-proof material, which is made to contain a quantity of carded cotton-wool. This material is employed on account of its peculiar properties, as it will not lose its buoyant power, or be saturated with water, even should the covering be accidentally ruptured. The zone is formed of greater bulk before and behind, the sides being flat, so as not to impede the action of the arms. This dress secures perfect safety, whether the wearer is a swimmer or not, and he may remain in the water for a lengthened period without wetting so much as his clothes, over which the floating dress may be worn.

EDITORS' JOTTINGS AND MECHANICAL RECORD.

Application of Guano.—We find the following article in a late number of the *Lawrence Home Review*:

"As I was passing by the fine estate of Mr. Rogers, in Danvers, formerly a part of the Derby Farm, my attention was arrested by the luxuriant growth of grass in his fields, so that I was induced to inquire what had been done to start it thus ahead of all other fields. The farmer told me it had been brought about by the application of liquids (urine of cattle) gathered under his stall, mixed with guano, and the whole spread upon the ground, by being pumped from a cistern into a cask set upon wheels, and scattered as is water upon streets. This application was made about four weeks since. Where the watering-machine passed is distinctly apparent, by the quantity and richness of the grass, no other dressing having been applied to the field this season. If my memory is right, Mr. R. more than doubles the quantity of his grass on several acres this season, simply scattering the urine thereon; and now by mixing it with a small quantity of guano, of good quality, the effect is most astonishing. It is too early in the season to say what will be the effect upon the crop, but I mention it that those who are curious in these matters may examine it for themselves. Much has been said of the benefits to accrue from *model farms*, where experiments can be tried, that individuals can not afford to undertake; but when men with ample fortunes undertake such experiments, and are willing that others should see them, they become *models* themselves, for the benefit of the community in which they live."

A Miracle of Art.—There is on exhibition in Paris, at the present time, in *Rue Neuve-des-Petits-Champs*, (a long name for New-Littlefield street,) No. 5, one of the most remarkable pieces of masterwork which the union of art and science has ever produced. It consists of a picture about three feet square. This picture is made up of colors admirable for their beauty and boldness, but there is no *subject*. The most experienced eye can detect nothing but disjointed and half-formed approximations toward a coherent design. The most able artist sees there only the finest colors, but no one can tell what they are intended to represent. In the middle of the picture, which is horizontally placed, is a mirror formed by a copper cylinder, covered by a perfectly polished coating of silver. This mirror is usually veiled. So far there is little remarkable, and the greatest amateurs in painting would hardly consent to spend five francs on such an apparently profitless study. But it is impossible not to feel a glow of admiration when, on uncovering the mirror, there is represented upon it, in the brightest reflected rays, the whole scene of the Crucifixion. The partial coloring then takes a character of incontestible superiority, and presents to the astonished spectators a picture composed of six most perfect figures, depicted with a degree of boldness such as the master-painters alone knew how to impart to the subject which it was their glory to represent.

The Manufacturing Enterprise of Fitchburg, Mass.—Few places in this commonwealth have made such rapid progress in material prosperity as the fine town of Fitchburg. In 1850, according to the census of that year, the value of the manufactured articles produced in the town was a little rising $1,500,000. In 1853, as we are informed by Dr. Alfred Hitchcock, who has been investigating the matter, Fitchburg manufactured $2,000,000 worth of articles, of which about $500,000 was in paper, and $100,000 in steam-engines and machinery. The other fabrics were chiefly cotton and woollen goods, scythes, chairs, etc. In addition to this, three new mills will probably go into operation within the next three months, which will add a quarter of a million of dollars to the annual product of manufactured articles. There are within the limits of Fitchburg eleven miles of available mill-stream, (the Nashua river and its branches,) not more than one half of which is improved.

With such superior facilities for manufacturing purposes, and with the encouraging results already obtained, the industrious and enterprising people of Fitch

burg may confidently look forward to a future of greatly increased prosperity, which will be as well deserved as it will be honorably gained. An important consideration in the growth of Fitchburg is the fact that it furnishes a steady and profitable home-market for the agricultural products of that section of Massachusetts, a fact which is doubtless fully appreciated by the farmers in that vicinity.

Model Farms.—A plan has been devised in Maryland, under the auspices of the State Agricultural Society, for the purchase and outfit of an experimental farm, and for the erection of an agricultural college thereon. It is to be a joint-stock concern, with a capital of one hundred thousand dollars, divided into four thousand shares of twenty-five dollars each—the holder or holders of forty shares of stock being entitled to be always represented by a pupil, free of all charges for instruction.

An attempt has been made to establish such an institution in the District of Columbia—an institution which at first shall be a county undertaking, but which may at some future day be rendered the nucleus for a national institution for industrial education, the application of the sciences to agriculture, the mechanic and useful arts. Several public-spirited gentlemen have interested themselves in the enterprise, and the prospects are that their labors will be rewarded with success.

Preservation of Roots.—Many kinds of roots, when stored in the cellar, are liable to heat and rot. This is especially the case with the ruta-baga turnip, and the sugar-beet. In storing these roots, I generally construct temporary bins fo their reception, around the sides of my cellar, in the following manner. I in the first place set some uprights one foot from the cellar-wall, and board up to the requisite height. Sleepers are then put down, and a floor laid, three or feet in width; the front is then put up, and the ends. The boarding should be open, in order to secure as thorough a ventilation of the roots as practicable, and hence narrow boards are preferable to wide ones. After storing the crop, the cellar should be left open for several days, and then opened frequently for a few hours daily, till the weather becomes quite cold. In this way roots may be preserved without any liability of heating. Potatoes are rarely injured by fermenting; they are much more liable to be deteriorated by drying, and the action of light. A moist, dark cellar is the best for their preservation.—*Cor. Ger. Tel.*

General Agency.—The publisher of *The Plough, the Loom, and the Anvil*, believing it in his power to be of essential service to the readers of that journal, in the purchase or sale of various articles, and the transaction of various kinds of business, would announce to them that he is ready to execute any such commission which he may receive, including the purchase of books of any description; implements connected with agricultural, manufacturing, or mechanical operations; artificial manures; farm and garden seeds, etc., etc. One of the gentlemen connected with the journal is a proficient in music, and experienced in the selection of piano-fortes, flutes, etc., and will execute orders in that department.

He will also act as agent in the purchase and sale of Real Estate.

☞ Particular attention to business connected with the Patent-Office.

Letters of inquiry on these matters will be promptly attended to.

NEW BOOKS.

Ida Norman; or, Trials and their Uses. By Mrs. Lincoln Phelps. 2 vols. in one. New-York: Sheldon, Lamport & Blakeman. 1854.

This is a book that interests and at the same time instructs the reader. The design of the author was to inculcate good moral teaching in a pleasing form, and she has succeeded in a remarkable degree. The scenes commence with the days of school-going, and succeed each other very naturally, through foreign travel, to that universal goal of fictitious writings, love and marriage. We commend the volumes to all our readers.

A JOURNEY TO CENTRAL-AFRICA; or, Life and Landscapes from Egypt to the Negro Kingdoms of the White Nile. By BAYARD TAYLOR. With a Map and Illustrations by the Author. New-York: G. P. Putnam & Co. 522 pp. 12mo.

THE reputation of Bayard Taylor as a writer is too well known to need description or commendation from any quarter. The ease and familiarity of his style is so complete that the reader can not fail to enjoy it. He goes into no learned disquisitions, nor deep ethnological researches, but gives you in this volume, in good shape, the very thing described in the second part of the title above cited. His illustrations are good, but we hope we shall have Mr. Taylor's physiognomy, unembarrassed with an "oriental costume," in some forthcoming volume. The publishers deserve high commendation for the manner in which they have executed their part of the labor.

HERMIT'S DELL, from the Diary of a Penciller. New-York: J. C. Derby. 285 pp., 12mo

THIS is a volume of "desultory pencillings," which "are woven in somewhat fanciful web," as the author says in his dedication. He sometimes "weeps with the sad, and laughs sometimes with the gay;" but he has given us no connected "thread," not even one long enough to excite in the reader any especial interest, either in its past or future. The hermit, who might be expected to act as heroine, is mentioned but once or twice, and in this she fares like most of the numerous characters introduced to the reader. The publisher has done his part admirably. Few works of this class are so handsomely executed.

THE INEBRIATE'S HUT; or, The First Fruits of the Maine Law. By Mrs. S. A. SOUTHWORTH. Third Thousand. Boston: Phillips, Sampson & Co. 1854.

THIS work is not without its occasional faults of rhetoric, but they are comparatively unimportant. In general it is well written. The characters represented are drawn with a bold hand, and together they are woven into a narrative which excites a deep interest in the reader. On this subject, imagination must borrow from actual life its highest, deepest colorings. The fall of Mr. Lee has too many prototypes for any unfavorable criticism; and his rising again, surrounded on all sides by temptation, has hitherto proved not only a rare event, but also a Herculean task. But under such protection as this law offers, the victim of appetite, and his friends, may at least indulge hope. The perusal of this little volume will set forth the claims of this law very clearly to the perception of the reader, while the story will deeply excite his sympathies.

KANSAS AND NEBRASKA: The History, Geographical or Physical Characteristics and Political Position of those Territories, etc. By EDWARD E. HALE. Boston: Phillips, Sampson & Co. New-York, J. C. Derby. 1854. 12mo, 247 pp.

THIS volume is the result of an examination of numerous authorities of recent and of earlier date, and exhibits thorough research on the part of the writer. Much of the volume is historical. The geography of the country is illustrated by a good map. It also gives an account of the Emigrant Aid Companies, with directions to emigrants. To this class it is very useful as a book of reference, as well as of general information.

LECTURES ON ARCHITECTURE AND PAINTING, delivered at Edinburgh in November, 1853. By JOHN RUSKIN, etc. With Illustrations, drawn by the Author. New-York: John Wiley. 1854. 12mo, pp. 189.

THIS small volume is rich in learning, rich in science, and rich in taste. Not a page could be spared, and we only wish that it was much more extensive than it is. There are, however, several pages of "addenda" to three of the four lectures, in which the more concise statements in the lectures are expanded and illustrated, which greatly increase the value of the book. We purpose to make liberal extracts from this volume in our subsequent numbers. We wish every one of our readers had a copy of the work, especially those who build either for themselves or others.

THE POLAR REGIONS; or, A Search after Sir John Franklin's Expedition. By Lieut. SHEPARD OSBORN, Commanding H. M. Steam-Vessel Pioneer. New-York: A. S. Barnes & Co. 12mo, pp. 216.

IT would be difficult to write a work on this subject, truthfully, which would not be highly entertaining. The scenery to be described is so strange and so grand, the perils are so sudden and so great, the sufferings, even, so peculiar, that curiosity at least is kept in constant activity. This volume is a journal, in narrative form, well written and quite instructive. At the present juncture, when news, which has some claim to authenticity, has reached us, of the death of the heroic adventurer for whom the writer and his companions were in search, the volume has a peculiar interest.

EMILY HERBERT; or, The Happy Home. By M. J. MCINTOSH, author of Blind Alice, Jessie Graham, Florence Arnold, etc., etc. New-York: Appleton & Co., pp. 165, 16mo.

MISS MCINTOSH aims not at writing a readable book only, but one that shall exert a good moral influence. With those who thus aim high, and whose minds are highly cultivated as that of Miss McI., success in this higher aim naturally includes success in the lower. This little story is an illustration of this. The value of principle, and the consequences of a want of it, are well set forth, and without any intricacy of plot or astounding development, possible and even probable results from given courses in every-day life are familiarly set forth, in purest Saxon, and while the young are especially in the writer's view, all ages will read this little tale with pleasure and satisfaction.

TRAVELS IN PERU, on the Coast, in the Sierra, across the Cordilleras and the Andes, into the Primeval Forests. By Dr. J. J. VON TSCHUDI. Translated from the German by THOMASERIA ROSS. Complete in one volume. New-York: A. S. Barnes & Co. 1854. 12mo, pp. 354.

THIS entertaining volume is a plain statement of facts deemed worthy of record, whether in the country or in the manners, habits, appearances, etc., of the inhabitants, in a tour undertaken by this distinguished European traveller, for the purpose of making zoological investigations. The author is a man of great learning, careful observation, and of peculiar tact in description. Hence this volume is entitled to especial consideration. Part of the territory described is ground hitherto unoccupied by former tourists.

PERUVIAN ANTIQUITIES. By MARIENO EDWARD RIVERO, Director of National Museum Lima, etc., and JOHN JAMES VON TSCHUDI. Translated from the original Spanish, by FRANCIS L. HAWKS, D.D., LL.D. New-York: A. S. Barnes & Co. 1854. 12mo, pp. 306.

ONE of the authors of this volume is a native Peruvian, and the other, the eminent author of the work last described. It is worthy of attention, not merely from the deservedly great reputation of its writers, but for its intrinsic merits as an able and correct representation, not only of the Peru of ancient times, as illustrated by its remarkable architectural remains, but of Peru also brought down to a period as late as 1851, by those who are quite competent for this service. It is the result of many years' labor. The work is also well illustrated, by a selection from fifty-eight large plates, most of them colored, and well executed, which, in a separate binding, accompany the original work. The views taken are learned rather than popular, embracing personal forms, languages, government, culture, religious ceremonies, state of the arts, etc. The last chapter is on ancient monuments, with several illustrations.

THE PRACTICAL MECHANIC'S JOURNAL.

THE October number of this excellent journal is on our table. It well sustains the high character we have given of the previous numbers. Stringer & Townsend, of this city, are the American agents.

The City-Side; or, Passages from a Pastor's Portfolio. Gathered by Cara Belmont. Boston: Phillips, Sampson & Co. New-York, J. C. Derby. 1854. Small 8vo, pp. 297.

This is an offset to Shady-Side, and gives the experience of a minister who proves himself a man of excellent judgment, and every way well fitted for his place. Though he encounters some unpleasant passages, he neither vexes himself nor others on account of them, but goes on his way, like a man, as he is, neither exhibiting cowardice on the one hand, nor pugnacity on the other. His wife is also just what she ought to be, a remarkable coïncidence. It is a useful book—an entertaining narrative—remarkably free from faults of rhetoric, and well worthy a careful reading.

NEW MUSIC.

Messrs. Wm. Hall & Son have recently published a large number of pieces, many of which are very fine. Among them we would name, *Spring Flowers*, a brilliant waltz, by M. Iucho; *Dream Life*, Schottisch, by Francis H. Brown; *The Mountain Zephyr*, Polka, by J. A. Fowler; and *The Russian Quadrille*, by H. N. Goodban.

Several vocal pieces are very beautiful. *Dreaming of Thee, for ever; Annie dear, good night; I love and I am happy;* are all composed by W. V. Wallace, and are very sweet airs, and not difficult. *My Home in Old Kentuck*, and *Down the River, down the Ohio*, are excellent in their way; while a long list of compositions, of other styles, are equally worthy of attention.

Note.—Grisi and Mario continue to delight our city audiences with their wonderful ability. The more we hear Grisi, the more we are satisfied that, as an *actor and singer*, she is at the very head of her profession, the world over.

List of Patents Issued

FROM SEPT. 5 TO OCT. 3.

Leander W. Boynton, of South-Coventry, Conn., improvement in machines for cleaning wool.

Hezekiah C. Pridgham, New-London, Conn., and James M. Stewart, Norwich, Conn., apparatus for turning the leaves of books.

Daniel Carpenter, Brooklyn, N. Y., improvement in surface-condensers for marine-engines.

Nathaniel Colver, Detroit, Mich., improvement in boots and shoes.

John B. Cornell, New-York, improvement in metallic slat-shutters.

Wm. Craig, New-York, improvement in oscillating-engines.

Perry Dickinson, Woodcock township, Pa., improvement in mill-stone dress.

Joseph Gatleg, Rome, N. Y., improved piston or valve for rotary-pumps, etc.

Warren Gale, Troy, improvement in straw-cutters.

Abram J. Gibson, Clinton, Mass., improvement in coupling for carriages.

John L. Maxwell, Baltimore, Md., improvement in ventilating ship-timbers.

Seymour N. Marsh, New-York, improvement in trusses.

John W. Middleton, Philadelphia, improved method of applying heat to dilate gases, for the purpose of elevating water.

Gilbert Maynard, Greenfield, Mass., improvement in corn-shellers.

James McGregor, Jr., New-York, improvement in cooking-stoves and ranges.

Andrew Mayer, Philadelphia, improved regulator for gas-burners.

John W. Middleton, Philadelphia, improved apparatus for distributing fluids.

Ephraim Morris, South-Bergen, N. J., improvement in apparatus for determining the weight of cargoes in vessels.

Newell North, Stow, Ohio, improved spoke-machine.

Wm. E. Osborn, Milton, N. Y., improvement in breech-loading cannon.

Jos. Phares, Cincinnati, improvement in tailors'-shears.

Philander Shaw, Abington, Mass., improvement in sewing-machines.

Samuel Shelden, Cincinnati, Ohio, improvement in portable grist-mills.

Lorenzo Simonds, Boston, improvement in palate for artificial teeth.

Don Carlos Smart, Cambridgeport, Mass., improvement in curtain-fixtures.

Franklin G. Smith, Columbia, Tenn., mode of operating fire-engines.

Henry W. Adams, New-York, improvement in breech-loading fire-arms.

Elliot C. Badger, Warner, N. H., improvement in machines for dressing mill-stones.

Wm. Black, Alleghany, Pa., improvements in steam-engines.

Jas. C. Burnham, West-Jefferson, Ohio, improvement in maize-harvesters.

Chas. J. Conrad, Lower Augusta township, Pa., for method of sawing shingles.

John Davis, New-Bedford, improvement in telegraphic keys.

Henry Eddy, North-Bridgewater, Mass., improvement in bee-hives.

James R. Napier, Glasgow, and William J. M. Rankins, Goovan, Scotland, improvement in air-engines.

Wm. P. Goodmand and Samuel Morris, Springtown, Ind., improved portable staging.

Thaddeus Hyatt, New-York, improvement in vault-lights.

Wm. G. Elliott, Blisworth, Eng., improvement in making slag-ware.

Benjamin Pulghum, Richmond, Ind., for sawing-machines.

John W. Middleton, Philadelphia, for tidal or current hydraulic ram.

William H. Morrison, Marion county, Ind., for fire-arms.

Henry B. Myer, Buffalo, for mode of converting the backs of car-seats into beds or lounges.

A. N. Newton, Richmond, Ind., for breech-loading fire-arms.

Isaac Pitman, Reading, Mass., improvement in rosin-oil lamps.

Marvin Smith, New-Haven, Conn., improved water-meter.

W. G. Sterling, Bridgeport, Conn., improvement in counting-machines and machines for indicating motion.

John Tapley, Frankfort, Me., improvement in pumps.

Wm. Thornley, Philadelphia, improved safety-washer for securing wheels to axles.

John J. Weeks, Buckram, N.Y., improvement in sausage stuffers.

Archibald Winter, Rondout, N.Y., improved machine for sawing firewood, etc.

Loren J. Wicks, New-York, improved method of operating guide-rollers and feed-clamps in sawing-machines.

Benj. F. Upton, Bath, Me., improved apparatus for polishing daguerreotype plates.

Abner Whiteley, Springfield, Ohio, improvement in grain and grass-harvesters.

Wm. H. Akins and Jos. C. Burritt, Utica, N. Y., assignor to W. H. Akins, aforesaid, improvement in calendar-clocks.

Edward L. Seymour, New-York, assignor to Daniel Brown, of same place, improved gold-separator.

John Williams, Hartford, Conn., assignor to F. Curtis & Co., of same place, improvement in calendar-clocks.

N. Aubin, Albany, improvement in gas-generators.

Fordice Beals, New-Haven, improvement in fire-arms.

Edward Brown, Rindge, N. H., improvement in elastic goods.

Schuyler Briggs and John G. Talbot, Sloansville, N. Y., improved neck-yoke.

Gardiner Chilson, Boston, improved hot-air furnace.

Geo. Copeland, Danville, Me., improvement in clasps for loom-harness.

Jos. A. Corwin, Newark, N. J., improvement in knitting-machines.

John Dame, Portsmouth, N. H., improved parrel and bow.

John Drayton, Buffalo, improvement in bedstead-fastenings.

Alex. Hall, Loydsville, Ohio, improvement in electric-clocks.

Wm. Graham and Lawrence McLaren, Philadelphia, improvement in railroad car seats.

Moses E. Halsey, New-York, improvement in chair-frames.

Aaron L. Hatfield, Lewisburg, Pa., improvement in machines for adding numbers.

Thos. Hardman and Albert Vose, Pittsfield, Vt., improvement in whiffletrees.

Henry Hockstrasser, Philadelphia, improved machine for paging books.

J. F. Keeler, Cleveland, improvement in platform-scales.

Chas. R. Landman, New-York, improved safety-lamps.

John Baptiste Laville, Paris, France, improvement in machinery for felting hats or hat-bodies. Patented in France, Aug. 17, 1852.

Paul Noody, Camden, N. J., improvement in connecting a series of car-brakes.

Septimus Norris, Philadelphia, improvement in running-gear of locomotive-engines.

Jos. Stockton, Warren county, Ky., improvement in springs to the knives of straw-cutters.

John J. Weeks, Oyster-Bay, improvement in harvesters of grain and grass.

Moses D. Wells, Morganstown, Va., improvement in washing-machines.

Joel Wisnor, Aurora, improvement in washing-machines.

Arad Aldrich, Princeton, Mass., assignor to J. L. Cooper, Worcester, Mass., improvement for cutting irregular forms.

D. W. Gitchell, Rahway, N. J., assignor to J. C. Wagstaff, New-York, improvement in uniting bats for making seamless felt garments.

William P. McConnell, Washington, improvement in process for making illuminating-gas from wood.

Abner Chapman, Fairfax, Vt., improvement in paddle-wheels.

Chas. M. Cresson, Philadelphia, improvement in the form of gas-retorts.

Victor Beaumont, New-York, improvement in steam-gauge.

Thomas Batchelder, Candia, N. H., machine for manufacturing frames for wood-saws.

Patrick S. Devlan, Reading, improvement in brick-machines.

Richard Deering, Jr., Louisville, improvement in circular stone-saws.

Stephen J. Gold, New-Haven, improvements in warming houses by steam.

R. L. Hawes, Worcester, improvements in drying cloth.

Thos. J. Harris, Jr., New-York, improvements in fastenings for garments.

J. Kimbell, Zanesville, Ohio, improved dumping-car.

J. Y. Leslie, Cincinnati, improvement in knitting-machines.

Jacob J. Lownds, New-York, improved pen and pencil-case.

Francis H. Smith, Baltimore, improvement in brick-machines.

Wm. H. Robertson, Hartford, improvement in machines for dressing stone.

Wanton Rouse, Taunton, improvement in self-acting mules.

Andrew Rankin, Newark, improvement in making hat-bodies.

Silas S. Putnam, Boston, improvement in curtain fixtures.

Samuel Peck, New-Haven, improvement in the manufacture of daguerreotype cases.

Wm. Palmer, New-York, improvement in apparatus for starting railroad-cars.

Zachariah M. Paul, Alexandria, La., improvement in brick-machines.

Spencer Moore, Central-Bridge, N. Y., improvement inthe feeding hoppers of threshers and separators of grain.

John Mable, English Neighborhood, N. Y., improved pen and pencil-case.

Wm. C. McKee, Philadelphia, improvement in railroad drawbridge, and switch-telegraph.

Benj. B. Webster, Boston, improvement in mosquito-curtains.

Ervin B. Tripp, Concord, improved printing-press.

Richard A. Tilgham, Philadelphia, improvement in processes for purifying fatty bodies.

Joseph Thatcher, Philadelphia, improvement in looms.

John Wilcox and S. H. Whitridge, Philadlephia, improvement in sewing-needles.

John E. Grant, Charlestown, Mass., assignor to Cyrus Carpenter and Augustus D. Shaw, Boston, Mass., improvement in hot-air furnaces.

Levi Van Hoesen, of New-Haven, assignor to the New-Haven Iron Railway Company, New-Haven, aforesaid, improvement in piano-forte stools.